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ABSTRACT

This document is designed to help local practitioners construct new tech prep systems that bridge the federal Tech Prep Education Act with the new School-to-Work Opportunities legislation. Section I provides a historical and philosophical foundation for new systems. It describes the movement's roots, legislation, and local, state, and federal roles. Section II discusses the rationale for creating new systems, offers six core concepts, and presents a vision of what education can be, a preferred future. The core concepts state that tech prep should do the following: (1) be grounded in an integrated and authentic core curriculum; (2) articulate secondary and postsecondary education; (3) be a highly relevant approach; (4) be an approach that focuses on outcomes and increased student performance; (5) provide an accessible and viable option for all students; and (6) be implemented with a highly collaborative approach. Section III describes perspectives, processes, and strategies for planning, implementing, and evaluating tech prep. It focuses on these areas: the importance of people involved; strategies to engage their full commitment; the task of drafting the plans by creating a shared vision, mission statement, goals, and policies; 20 specific components and 5 approaches taken by local consortia to configure them into a tech prep system; barriers; and program evaluation and continuous improvement. Appendixes include 108 references and national tech prep experts contact list. (YLB)

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BUILDING A PREFERRED FUTURE WITH TECH PREP SYSTEMS

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BUILDING A PREFERRED FUTURE WITH TECH PREP SYSTEMS

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Finally, we wish to thank our families and loved ones for supporting our work on this project. Any *building* project is sure to encounter a few obstacles, but with the encouragement of those closest in our lives, we were able to overcome them. Together, we are proud to have created this document, and to have begun our journey of building a preferred future.

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EXECUTIVE SUMMARY

This document presents the perspectives, core concepts, and processes needed to develop a shared vision of Tech Prep. It strives to provide the basis for local practitioners to construct new Tech Prep systems that bridge the federal Tech Prep Education Act with the new School-to-Work Opportunities (STWO) legislation. To support that important objective, this document offers numerous practical ideas about Tech Prep planning and implementation. The first two sections focus on "Exploring Efforts To Restructure Education" and "Inspiring the Future." The third section on "Implementing Tech Prep Systems" focuses on processes to assemble key components into workable Tech Prep initiatives.

This publication provides a historical and philosophical foundation for new Tech Prep systems. In addition, it presents six core concepts that should be considered when developing any Tech Prep system. The six concepts are as follows: (1) Tech Prep should be grounded in an integrated and authentic core curriculum that spans the educational system; (2) Tech Prep should formally link (articulate) secondary and postsecondary education, but optimally it should link kindergarten through lifelong learning; (3) Tech Prep should be a highly relevant approach to teaching and learning, using the workplace and surrounding community to connect work-based learning to school-based learning; (4) Tech Prep should be an approach that focuses on outcomes and increased student performance; (5) Tech Prep should be an accessible and viable option for *all* students, not only the "neglected majority"; and (6) Tech Prep should be implemented with a highly collaborative approach built upon a network of people and organizations that form a local consortium. Processes used to create Tech Prep systems which embody these six core concepts should be well-organized, strategically planned, carefully implemented, and continuously evaluated. The later half of this report presents an extensive discussion of strategies to develop Tech Prep systems.

Ideas presented throughout this document are based on an exhaustive review of the literature on educational reform and restructuring, Tech Prep planning and implementation, and organizational leadership and change. In addition, the findings and recommendations of a national survey of local Tech Prep coordinators conducted by the senior author of this report and others (Bragg, Layton, & Hammons, 1994) are drawn upon extensively. This information is supplemented further with the ideas of seventeen leaders of the nation's Tech

Prep movement. How were these seventeen chosen? Eight were the designated leaders of the U.S. Department of Education national demonstration sites. The other nine were nominated by these eight demonstration-site leaders or other local practitioners on the basis of their significant contributions to Tech Prep at the state and/or national level. Together, these seventeen leaders generously shared their ideas about Tech Prep through telephone interviews conducted in late 1993 and early 1994. (See Appendix A for the names and addresses of these individuals.) We are extremely appreciative of the ideas these experts shared with us—they were truly inspirational.

Like building a house, Tech Prep implementation moves through many phases. From the early stages of inspiration and design to the inevitable process of remodeling what has become outdated, both require a solid foundation, the coordination of many people, a heavy investment of time and money, and an ongoing commitment to improvement. We, the authors, aspire for Tech Prep to become a lasting structure, one able to withstand internal and external forces (e.g., shifting winds of reform, changing needs, evolving technologies). Of course, adequate time and the commitment of many diverse stakeholder groups will be required to ensure this sort of stability. The time required to build a quality Tech Prep initiative is extensive; some estimate five to ten years to make lasting changes in an educational system. However, the kind of action needed to reform education today seems more closely aligned to that of an Amish barn raising, a phenomenon that epitomizes quick response through teamwork, a crucial element of an effective local Tech Prep consortium.

The collective expertise of leaders from both the public and private sectors is needed to build Tech Prep. Individual talents and efforts must dovetail to create a unified vision of what an improved system of education can be. Goals, policies, and procedures must be developed and carried out to create a superior educational system, one that can ensure a brighter future for all students. Building that future will be challenging, yet it represents a goal all educators and concerned citizens should strive to attain. We hope this document helps you and your local consortium build your preferred future.

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EXPLORING EFFORTS TO RESTRUCTURE EDUCATION

Over a decade ago, the National Commission on Excellence in Education sounded an alarm to the public about American education when it published *A Nation at Risk* (1983). With this action, the nation's most recent era of educational reform was launched. Since the early 1980s, two waves of reform have swept the United States, leading to the current emphasis on educational restructuring, or what some refer to as *systemic reform*. Considering the vast array of reforms in the past decade, it is remarkable that at least some approaches involving vocational education did not receive greater attention. Instead, vocational education was seen as part of the problem more than as part of the solution.

Only recently has interest in the relationship between school and work been mentioned as a potential component of educational reform on a national scale. Reports such as *America's Choice* (Commission on the Skills of the American Workforce, 1990) and *What Work Requires of Schools* (Secretary's Commission on Achieving Necessary Skills, 1991) as well as new federal legislation on School-to-Work Opportunities (STWO) have encouraged a stronger relationship between education and work as an approach to improving teaching and learning, especially for youth who have not benefited from previously advocated academic reforms. What does it mean to restructure education? What role can reforms such as Tech Prep and STWO play? This section will begin to address these important questions.

The Meaning of Restructuring

Based on the recommendations of *A Nation at Risk* (1983), the first wave of educational reform was initiated. To resolve the problems associated with poor quality in American education, this report recommended several reform strategies; chief among them was a demand for higher academic standards and core academic curriculum. States played a particularly active role in carrying out these recommendations by implementing testing programs, insuring time on task, encouraging merit pay, and mandating graduation requirements. However, in only a few years the inadequacies of this wave of reform became apparent as many states were unable to determine precisely what change was occurring at the classroom level which is where improvement was needed most.

States could not change what they could not control, so the shift to a more grassroots approach to reform was inevitable. By the late 1980s, the second wave of reform was ushered in with the following basic premise: teachers had been charged with correcting nearly all that was wrong with education but had been given little authority to make the changes. The second wave of reforms continues today under the banner of "educational restructuring." Reforms associated with this restructuring wave are based on the hypothesis that America's existing system of education does not have the capability to deliver its goals and serve the needs of *all* students. Therefore, a new system of education is needed. To make this dramatic change, students, parents, educators, employers, and other concerned citizens are being challenged to consider new roles, responsibilities, delivery modes, and accountability systems, all a part of the restructuring wave.

Although no universal definition of restructuring exists, there are some well established areas of reform encompassed by this concept. Based on the National Governor's Association's (NGA) (1986) recommendations for educational restructuring, Dornsife (1992a) described the four major areas of reform associated with restructuring as follows:

1. *Curriculum and instruction reform* to promote basic and higher-order skill attainment, including attempts to integrate fragmented curriculum and use teaching strategies to more actively engage students in relevant, meaningful, and real-world learning experiences.

2. *Decentralized authority and decision making* to ensure that the most important decisions about teaching and learning are made at the school level, often through team-based, participatory approaches involving students, faculty, administrators, employers, citizens of the community, and other interested stakeholders.

3. *New staff roles* to ensure that faculty can work together to improve instruction. Collaboration to support incoming teachers, implement professional development, and adopt new educational innovations is a part of this reform area.

4. *New accountability systems* to more closely link rewards and incentives to student performance at the local level. These accountability systems increasingly advocate learner assessment practices that approximate the actual performances students are expected to carry out in school, work, and other life activities (pp. 3-5–3-6).

Together, these approaches are combined to attempt to create systemic change in education to improve what and how students learn: "It shifts the focus of reform from mandating what educators do, to looking at the results their actions produce" (Dornsife, 1992b, pp. 3-4). Newmann (1993) has contended that four themes consistently appear in restructuring efforts:

Theme 1: Depth of understanding and authentic learning
Theme 2: Success for all students
Theme 3: New roles for teachers
Theme 4: Schools as caring communities (pp. 6-7)

According to Newmann, although these common sense ideas about educational restructuring may eventually take hold, they may not necessarily bring about the degree of improvement hoped for in the nation's complex educational system. He suggests a more complete theory remains to be developed so that restructuring policies and practices can be better understood and perpetuated to improve education on a wider scale. Possibly, the approaches to Tech Prep systems described in this document can provide a starting place for the development of that particular "complete theory."

Based on an extensive analysis of reforms conducted over the past decade, Wang, Haertel, and Walberg (1993) indicated that new and innovative programs, projects, and strategies have been devised to address "governance and organization, home and community contexts, school demographics, curriculum and instruction, and classroom practices" (pp. 256-257). Conspicuously absent from this list is any hint of reform that integrates vocational preparation or work with traditional academic curriculum. Neither do these reforms include strategies that span the education levels such as with formal articulation between secondary and postsecondary education. The conclusions of Wang et al. about what constitutes "systemic" reform are paradoxical since one would expect them to address the entire educational system. However, apparently that has not been the case, making Tech Prep an attractive vehicle to reform because of its attention to these and other components of the educational system as a whole.

Over the past decade when educational reform focused almost exclusively on the reform of academic education, primarily for those destined to attend college, concern about the quality of education for the remaining group of youth was voiced. First, reports describing the "neglected majority" (Parnell, 1985) and the "forgotten half" (William T.

Grant Foundation, 1988a & 1988b) identified the problem of inadequate educational preparation for the vast majority of the nation's high school students. Later, prominent groups such as the Commission on the Skills of the American Workforce produced *America's Choice* (1990) and the Secretary's Commission on Achieving Necessary Skills (SCANS) created a series of reports pointing to issues related to the poor educational preparation of youth and adults for the nation's increasingly demanding workplace.

In the 1990s, these concerns merged to create educational initiatives that link much more closely the worlds of school and work. Tech Prep and other initiatives are beginning to be seen as frameworks for restructuring education (Dornsife, 1992a; Hoerner, 1991; National Center for Research in Vocational Education [NCRVE], 1992; Nothdurft & Jobs for the Future, 1990). These initiatives focus on the preparation youth should attain to navigate within and between the two worlds of school and work. Too often this approach to education is not well-developed, and, even when it is, it may be on the margins of the educational reform agenda. Why has this situation occurred? What role can Tech Prep and school-to-work play in restructuring education? Answers to these types of questions by seventeen national experts offered optimism. One after another, they affirmed the potential of Tech Prep to play an important role in educational restructuring.

Roots of the Tech Prep Movement

Tech Prep can be traced rather directly to the late 1960s when a few states began encouraging better coordination between high school and community college vocational programs. An example of such an effort occurred when a 1968 Oregon task force made recommendations to improve vocational education. This task force, consisting of representatives from the Oregon State Board of Education and State Department of Employment, recommended that occupational (vocational) education include (1) articulation between high schools and community colleges, (2) a "cluster approach" to occupational program planning, (3) exploration of occupations in grades seven through ten and the implementation of occupational programs in grades eleven and twelve, and (4) guidance and counseling services throughout all grades. In 1972, federal amendments on vocational education offered a similar emphasis, including advocating a unified effort to strengthen secondary and postsecondary articulation, and just provided for better connections between vocational and academic education (see Dornsife, 1992b). The Education Amendments of

1976 enhanced the role of two-year colleges in delivering technical training/retraining and encouraging better articulation between secondary and postsecondary vocational education.

Through the 1970s, efforts to articulate curriculum and formally connect courses and programs between levels of the educational system—secondary to two-year postsecondary and two-year to four-year postsecondary—became an increasingly high priority (Kern & Kern, 1993; Kintzer, 1976). By the early 1980s, the idea of secondary to two-year postsecondary articulation (primarily with community colleges) was accepted as good practice. In addition, other components that had been emerging somewhat independently such as applied academics and career counseling began to be unified in an initiative called technical preparation or simply Tech Prep.

In 1984, a small group of leaders was convened by the U.S. Office of Adult and Vocational Education as the National Commission on Secondary Vocational Education. The final report of this Commission (1984), *The Unfinished Agenda,* proposed numerous changes in vocational education, partly in response to criticisms of *A Nation At Risk* (National Commission on Excellence in Education, 1983). One recommendation of this Commission was to infuse more practical, work-relevant applications into academic courses and more theory and academic content into vocational courses. The Commission was one of the first to publicly endorse "tech prep curriculum" (1984, p. 18). This action affirmed Tech Prep as a model to coordinating secondary and postsecondary education, grounding learning in applied academics and technical studies, and easing student transition into two-year postsecondary education.

The Tech Prep Associate Degree (TPAD) Model

Shortly thereafter, Parnell (1985) provided a vision and conceptual framework for the development of a Tech Prep model. In his book *The Neglected Majority*, Parnell advocated high quality vocational education and applied academics, strong relationships between business and education, and increased emphasis on the two-year associate degree. He argued forcefully to refocus schooling to better meet the needs of the "neglected majority" of high school students who would never obtain the baccalaureate degree. The 2+2 Tech Prep Associate Degree (TPAD) model was designed primarily to meet the needs of these neglected students. In this model, 2+2 means the last two years of high school followed by two years of postsecondary education—usually at a community, junior, or technical college—culminating in an associate degree.

TPAD was envisioned to be a parallel curriculum to college prep at the high school level and articulated through formal 2+2 agreements with community colleges. Recently, Parnell spoke about how the idea of Tech Prep first developed:

> [I]n writing *The Neglected Majority*, I was aiming at students who are the vast majority in most high schools who will not likely earn a college baccalaureate [degree]. And yet, we have sold the American public on the idea that there is only one road to excellence in education, and that is the college-prep baccalaureate-degree program. . . . There must be another road or two or three to excellence. . . . So, [after] giving it a lot of thought, I came up with the term Tech Prep Associate Degree program, which would be a combination of the last two years of high school, along with a community or technical college experience. . . . [I] tried to describe it as an applied learning program, aimed at excellence in preparing people in an excellent way. (D. Parnell, personal communication, January 24, 1994)

Parnell (1985) saw TPAD as a curriculum that would provide a common core of "math, science, communications, and technology—all in an applied setting" (p. 144). He described the secondary portion of the curriculum as preparatory to avoid problems encountered by more traditional vocational education programs that had been criticized for focusing too narrowly on job-specific training. The secondary program was also to use an applied academics approach to curriculum integration supplemented with literacy and technical courses connected to career clusters and technical-systems study.

The postsecondary curriculum was described as the place for intense and specific technical specialization in such wide-ranging careers as nursing, electronics, computers, business, or agriculture. An occupational specialization was to be developed along with a broader foundation of technical and educational competence. Ultimately, this articulated secondary-to-postsecondary education was intended to culminate with a two-year associate degree, "the preferred degree for employers seeking to fill a broad range of mid-level occupations," according to Parnell (1985, p. 145).

By the late 1980s, programs patterned loosely after the TPAD model were beginning to develop. However, research by McKinney, Fields, Kurth, and Kelly (1988) created doubts about the extent to which Tech Prep was being adopted as Parnell had conceptualized it in the TPAD model. Of all the programs claiming to have secondary to postsecondary articulation, only about 10% were considered by McKinney and his colleagues as Tech Prep. Stern's research corroborated this finding when only 122 such programs were identified in 33 states by 1990 (cited in Nothdurft & Jobs for the Future,

1990). Most of these early programs offered traditional vocational courses articulated between the secondary and postsecondary levels. The majority of these contained time-shortened or advanced-placement articulation agreements and relatively few adopted the applied academics component of the TPAD model (Dornsife, 1992b).

In 1991, Parnell collaborated with Dan Hull to reintroduce the TPAD model in the book *Tech Prep Associate Degree: A Win/Win Experience* (Hull & Parnell, 1991). Although similar to the vision of TPAD first espoused by Parnell in 1985, the latter description seemed to place even more emphasis on applied academics as the foundation for curriculum and reinforced the urgency for Tech Prep to replace the general education track in comprehensive high schools. Together, Hull and Parnell were adamant about the potential of Tech Prep for reforming America's high schools. Parnell (1991) recommended the TPAD approach replace what he saw as the "unfocused" general education curriculum and stand alongside college prep and vocational education as "a third leg to the educational stool" (p. 25). He emphasized that these programs should stress the five Cs: (1) continuity in learning, (2) context-based learning (applied academics), (3) competency-based teaching, (4) communication between learning institutions (especially high schools and postsecondary institutions), and (5) completion with an associate degree (p. 26).

Replacing general education with Tech Prep and instituting the five Cs—both ideas vigorously advocated by Parnell and Hull—have been widely disseminated to practitioners engaged in Tech Prep via an organization called the National Tech Prep Network (NTPN), an organization of the Center for Occupational Research and Development (CORD). Together, Parnell and Hull have been exuberant in their enthusiasm for Tech Prep as an educational reform vehicle, particularly at the secondary level. Their ideas had an unmistakable impact on the development of new federal Tech Prep policy at the beginning of the decade of the 1990s, an action that has spread the idea of Tech Prep widely throughout the nation.

The Tech Prep Education Act

In the decade of the 1990s, the federal government stepped forward as a strong supporter of Tech Prep with the passage of the Carl D. Perkins Vocational and Applied Technology Education Act of 1990. Of particular importance in this legislation was the

Tech Prep Education Act which targets public policy and funding for implementation of local 2+2 Tech Prep programs. With bipartisan support from the U.S. Congress, the Tech Prep Education Act [Public Law 101-392, Title IIIE] came into effect in July of 1991. The intended impact of this federal legislation is to be felt in several areas; the stated purpose of the law is to meet a number of societal and economic challenges facing the nation.

Chief among the goals of the legislation is the necessity for the United States to remain competitive in an increasingly global economy with a more highly skilled and productive workforce. At the same time, the legislation recognizes that traditional approaches to schooling are inadequate to prepare many of the nation's youth for either further education or work beyond high school, especially special population groups and students not traditionally bound for college. Without first attacking school reform and workforce preparation issues, the legislation acknowledges that reaching the goal of global economic competitiveness is impaired. Tech Prep is seen as a primary vehicle to address the nation's need for improved schooling and better prepared workers. According to the law, a Tech Prep education program means

> a combined secondary and postsecondary education program which—
> (1) leads to an associate degree or two-year certificate;
> (2) provides technical preparation in at least one field of engineering technology, applied science, mechanical, industrial, or practical art or trade, or agriculture, health, or business;
> (3) builds student competence in mathematics, science, and communication (including applied academics) through a sequential course of study; and
> (4) leads to placement in employment. (U.S. Congress, 1990)

The legislation requires that Tech Prep be carried out by local consortia consisting of secondary educational agencies and postsecondary institutions that formalize strong and comprehensive linkages. This particular feature of the federal bill seems crucial to the notion of creating systemic change at the local level, especially where educational programs cross traditional curricular or organizational boundaries as occurs with Tech Prep.

In addition, a three-year plan is to be created and carried out by each local consortium funded under the Tech Prep Education Act. State agencies soliciting grants and ultimately funding local consortia are also responsible for giving special consideration to applications that (1) provide effective job placement activities or transfer of students to four-year baccalaureate-degree programs; (2) consult business, industry, and labor unions;

and (3) address dropout prevention and re-entry, the needs of minority youths, youths of limited-English proficiency, youths with handicaps, and disadvantaged youths (U.S. Congress, 1990).

By law, all local Tech Prep consortia funded under the Tech Prep Education Act are charged with addressing what are commonly referred to as the seven essential elements of Tech Prep:

1. *formal, signed articulation agreements* between the participants in the consortium
2. *a core of required courses* in mathematics, science, communications (including applied academics), and technologies in the two years of secondary school preceding graduation and two years of higher education or at least a two-year apprenticeship following secondary instruction
3. *Tech Prep curriculum development* appropriate to the needs of consortium participants
4. *inservice training for teachers* that focuses on implementation of curricula, provides joint training for all faculty in consortium-member institutions, and may provide training in special formats (e.g., weekends, evenings, summer sessions)
5. *training for counselors* that focuses on student recruitment, completion, and job placement
6. *equal access for special populations* to the full range of Tech Prep programs, including the development of services appropriate to such populations
7. *preparatory services* to help all populations participate in Tech Prep. (Brustein, 1993)

At present, many of the fifty states use these seven essential elements as guideposts for practitioners to build local Tech Prep systems. Even though it is too early to know the full impact of the federal Tech Prep legislation, there is no mistaking its effect on stimulating local activity. As was stated previously, prior to passage of the Tech Prep Education Act, only about 150 Tech Prep programs were known to exist across the nation. After passage of the Act and in FY92, over $60 million in seed money was appropriated to

the states to establish local initiatives; these dollars were used largely for local planning. Then, beginning in FY93, over $90 million was distributed annually to establish an estimated 850 local Tech Prep consortia (Layton & Bragg, 1992). FY93 grants averaged approximately $150,000 per local consortia. On average, these local consortia involved twelve secondary institutions, two postsecondary schools, and ten private-sector firms. Most of the efforts of these consortia were directed toward initial implementation, including carrying out activities such as inservice training of faculty and counselors, marketing to internal and external audiences, and development and delivery of 2+2 core curriculum, especially at the high school level (Bragg, Layton, & Hammons, 1994).

Since passage of the Tech Prep Education Act, influential groups such as the Secretary's Commission on Achieving Necessary Skills (SCANS) (1991) and the Commission on the Skills of the American Workforce (1990) have helped to increase momentum for Tech Prep. Foundational skills, workplace competencies, and other credentials of skill mastery recommended by these two Commissions have fit well with Tech Prep and helped local and state educators build curricula for it (e.g., see Peterson, B., 1993). Strategies advocated by the National Governor's Association (NGA, 1986) to restructure schools also may have bolstered Tech Prep implementation, especially in secondary schools. According to Dornsife (1992a), the NGA's approach to restructuring parallels Tech Prep in all four NGA-recommended areas: (1) curriculum and instruction, (2) authority and decision making, (3) new staff roles, and (4) accountability systems. With these structures in place, it seems that the potential for implementing Tech Prep is strengthened substantially. However, passage of a new federal law regarding the development of new educational systems linking school and work have the potential to have an even greater impact on Tech Prep.

The School-to-Work Opportunities Act

In 1994, Congress passed the School-to-Work Opportunities (STWO) Act and the Goals 2000: Educate America Act. Along with the Tech Prep Education Act, this bill may help to increase momentum for moving Tech Prep and other STWO systems to the mainstream of the nation's educational reform agenda. School-to-work goals should be integrated with the objectives of the Goals 2000: Educate America Act, a federal bill passed in March of 1994. Among other purposes, the Goals 2000 Act calls for the creation of

content and performance standards intended to raise the quality of education for all students. Together, STWO and Goals 2000 promote systemic educational reform nationwide to improve the quality of teaching and learning in the classroom and workplace. Grants to begin developing and implementing school-to-work systems have been awarded jointly by the U.S. Department of Education and the U.S. Department of Labor (1993).

The STWO legislation brings the sorts of experiential learning sometimes associated with vocational education forward to play a role in educational reform. Although separate from the federal vocational education (Perkins II), legislation endorses a role for work-oriented education in the nation's reform agenda. A primary goal of the STWO Act is to establish a national framework to encourage states to plan and implement statewide school-to-work systems that can assist youth in identifying and eventually obtaining rewarding work after completing secondary or postsecondary education.

According to Benson (1993), the STWO legislation emphasized the education of high school and two-year college graduates who often take the "middle-skilled jobs" (p. 4); an argument made by Parnell (1985) in his initial writing about Tech Prep. To accomplish this goal, Benson speculated that the STWO legislation would require preparing youths to be better decisionmakers and more cognizant of how their work impacts the quality of the products and services they produce. It will also demand graduates who are more capable of dealing with highly technical work environments, and who can contribute to the continual process of improving quality in the workplace.

Even though no one model is endorsed by the STWO legislation, one of several promising approaches identified is Tech Prep. Others are career academies, cooperative education, and youth apprenticeship. Each of these is seen as a potentially fruitful avenue to strengthening relationships among the following groups: vocational and academic education; educators and employers (i.e., school and work); and secondary and postsecondary education. A work-based component, school-based component, and activities that connect school and work (i.e., connecting components) are essential to any school-to-work system funded under this new federal legislation. Successful completion of an STWO program should result in a high school diploma, a certificate or degree from a postsecondary institution, and/or an occupational skill certificate. According to the U.S. Departments of Education and Labor (1993), "The skill certificate will be a portable,

industry-recognized credential that certifies competency and mastery of specific occupational skills" (p. 2).

Three components form the foundation of the STWO bill. First, the *school-based learning component* requires career exploration and counseling, instruction in a particular career area, selection of a career major by grade eleven, and periodic evaluations linked to the challenging academic standards specified in the Goals 2000: Educate America Act. In addition, the school-based component endorses at least one year of postsecondary education. This requirement is similar to the postsecondary component of the 2+2 Tech Prep core curriculum. However, it falls short of the two-year degree requirement of Tech Prep, an area of concern for educators who see a minimum of a two-year degree as important to creating successful school-to-work opportunities with Tech Prep.

Secondly, *the work-based learning component* involves paid or unpaid work experience, workplace mentoring, and instruction in general workplace competencies as well as in all aspects of the industry. Competencies acquired by students require progressively higher-level skills consistent with the demands of the particular occupation. By obtaining this type of instruction, students are expected to be better prepared for advancement in a career.

Finally, the *school-to-work connecting component* is designed to ease the transition from in-school to out-of-school learning in the workplace. The purpose of connecting activities is to make sure students are well-matched with employers' work-based learning opportunities. This component ensures the school-to-work linkages are firm in creating a systemic approach. It can be carried out with a liaison who serves students, parents, teachers, counselors, administrators, schools, employers, and any others participating in the school-to-work experiences. Examples of connecting activities are support services such as career counseling starting in the early grades, staff development, technical assistance, and job placement. In addition, school-to-work systems should conduct follow-ups of graduates to determine the extent to which intended outcomes have been met and to encourage student placement in workplace experiences consistent with policies and practices of today's employers.

Bridging Tech Prep and School-to-Work Opportunities

Both the federal Tech Prep Education Act and STWO Act are designed to dramatically impact, even transform, local educational practice throughout the nation. Due to the efforts many practitioners have already devoted to implementation of Tech Prep (since it preceded STWO by three years), it seems only logical they will ask what direction they should take with passage of new STWO federal legislation. Will existing plans for Tech Prep need to be modified? How should Tech Prep be conceptualized to align with the new STWO legislation?

No one has all of the answers to these important questions; however, all of the seventeen Tech Prep experts interviewed as a part of this research enthusiastically endorsed strong linkages between the Perkins II and STWO. Many saw STWO as a logical extension of what many local consortia have already begun with Tech Prep under Perkins II, especially by strengthening the work-based and school-to-work connecting components. However, some of the leaders also recognized the tension inherent in implementing two quite similar yet different pieces of federal laws. They feared problems with competing forms of Tech Prep under the two pieces of federal legislation. Bottom line, they anticipated confusion about how practitioners should implement Tech Prep, creating the need for strong leadership of new Tech Prep systems.

To ensure that effective Tech Prep initiatives are created in the future, many of the leaders interviewed felt it would be important for local and state practitioners to begin *bridging* these two federal initiatives. This will require careful examination of both pieces of legislation, highlighting similarities and reaching consensus on how to approach differences or gaps in the policies. Clearly, the least desirable option would be to set up competing or even incompatible approaches at either the local or state levels.

Approaches to Tech Prep that meet both the specifications of the federal Tech Prep Education Act as well as the new STWO legislation are viewed as most beneficial to future educational reforms and the students who can benefit from them. However, some of the leaders cautioned against launching into the work-based learning component to the extent that the school-based component of Tech Prep may be jeopardized, especially the curriculum articulation and integration features central to the Tech Prep model. To many

local initiatives, work-based learning may be a new component, so careful consideration of the role this feature should play in new Tech Prep systems is required.

The notion of *bridging* Tech Prep and STWO was seen by many of the seventeen leaders we interviewed as an important concept.[1] Gisela Harkin of the Office of Adult and Vocational Education, U.S. Department of Education, described the transformation of the Office's federal team from its sole focus on Tech Prep to an emphasis on bridging Tech Prep with other educational reforms, especially STWO:

> We used to have a Tech Prep team just a few months ago. It's no longer in existence because we don't want to see Tech Prep in isolation. That implies that we only deal with Tech Prep, and that it is a program. The message we're trying to convey is that it's a reform strategy. Therefore, we now have a new team and it's called the bridging team. What we are trying to do is bridge all educational reform initiatives that are going on, for example Goals 2000, Perkins reauthorization, School-to-Work Opportunities. Tech Prep is part of all of them. (G. Harkin, personal communication, February 4, 1994)

Harkin further explained the importance of incorporating a viable work-based learning component into Tech Prep systems.

> The work-based component is really key to the success of the School-to-Work Opportunities Act of 1993. Active participation of business and industry is crucial. We advise getting employers involved from the outset, all the way from curriculum development to the actual hiring of students. Employer participation needs to go beyond simply advising or providing financial or in-kind support to being employed as full members of the consortia.
>
> The second advice would be to look at those Tech Prep programs that are already in place that do have the work-based components, and identify what parts of them can be adapted, because there's really no need for reinventing the wheel.
>
> There are a number of efforts that are underway to include work-based learning among Tech Prep consortia, through either cooperative education, work study, youth apprenticeship, or internships. It's really important,

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[1] Ideas presented throughout this document are supplemented with quotations obtained from seventeen leaders of the nation's Tech Prep movement. Although there are many individuals who could have been chosen for this research project, these seventeen were selected because of their local, state, and/or federal perspectives and their awareness of Tech Prep implementation activity occurring throughout the nation. Eight were the designated leaders of the U.S. Department of Education national demonstration sites. The other nine have made significant contributions to Tech Prep at the state and/or national level. These seventeen leaders were interviewed by telephone in late 1993 or early 1994. (See Appendix A for the names and addresses of these individuals.)

> especially now in light of the School-to-Work legislation. And, that legislation reads, not only a work-based component, but about paid work experience. Tech Prep, being one of those vehicles or strategies, it's really important that local consortia are going to work toward work-based learning. (G. Harkin, personal communication, February 4, 1994)

Consistent with this view, it is extremely important for states to play an active role in coordinating the various reforms involving Tech Prep and STWO. Historically, states have defined these types of initiatives differently to accommodate their own needs or those of local programs. In doing so, it is essential that the states carefully consider and communicate who the various reforms are designed to serve. Gary Crocker, Tech Prep Coordinator in the state of Maine, discussed the critical question of Tech Prep and STWO:

> We see Tech Prep as major educational reform. We see Tech Prep as an overarching educational reform movement that provides students an effective way to learn. Tech Prep is a companion program to youth apprenticeship and other educational reform efforts. I believe that it also provides enhanced educational opportunities for college preparatory programs that have provided little or no opportunity for students to apply the theory they learn in traditional classrooms. In Maine, we have a clear feeling that the greater the application the better. That's the best way to learn anything.
>
> We, in Maine, do not believe that youth apprenticeship or Tech Prep or registered apprenticeship or any other single approach is going to work for all students. All of the approaches need to be available as equal options. (G. Crocker, personal communication, January 21, 1994)

Nationally recognized as a leader of the Tech Prep Associate Degree (TPAD) model, Dan Hull spoke about the importance of Tech Prep as a sound foundation for the school-based component of a school-to-work transition program. He also affirmed the importance of Tech Prep developing the work-based learning component, including career exploration beginning as early as the ninth grade and more concentrated experiences extending throughout the postsecondary level:

> Tech Prep provides a framework for all the school-to-work initiatives. We can't do it all in a school-based learning site, we need a work-based learning site too. We don't want three or four different initiatives competing with each other, but we want the best of all of them. I think most people that looked at the early models of youth apprenticeship, including our counterparts that have been doing this kind of thing, would agree that the curriculum structures are not there yet. It took ten years to get there in Tech Prep, and now we've got something that will work. We need to build on what we've got. (D. Hull, personal communication, February 1, 1994)

Dale Parnell, as the author of the first major work to discuss Tech Prep, *The Neglected Majority* (1985), urged educators not to forget the importance of the school-based component which he sees as a major strength of Tech Prep. He cautioned against racing into work-based learning with students who may be ill-prepared to take part in the workplace:

> We have to have school-based learning and work-based learning brought together and the Tech Prep program is a great way to do that. . . . One of the worries I have . . . is that if you only talk about work-based learning—putting a lot of students out into youth apprenticeship—I'm afraid we're letting ourselves in for another round of criticism.
>
> [If we put] students out there who can't read or write or compute or see how what they're learning applies to anything, the employers are going to come back and say, "Gee, these students can't do anything." I think that's why we have to have the applied approach, along with the work-based learning approach. (D. Parnell, personal communication, January 24, 1994)

Diana Walter, director of one of the U. S. Department of Education's national Tech Prep demonstration sites in Pendleton, South Carolina, described herself as an early advocate of work-based learning. Her ideas reinforced Parnell's thoughts about the importance of students being ready to benefit from work-based learning experiences. She provided concrete suggestions to practitioners who are considering ways to bridge Tech Prep and STWO:

> I think one of the things that educators need to do is work with their employment community to create work-based learning experiences for students. Part of that task is helping employers understand what they're going to get out of it. . . . In any true partnership, every partner needs to benefit. It's going to be very difficult for certain areas of the country to generate work-based learning opportunities that are meaningful, as in particularly rural areas or even particularly urban areas.
>
> My interest in school-to-work is a broader look at the variety of ways the classroom and the workplace can be interfaced . . . creating opportunities that are not only sophisticated, like a true youth apprenticeship, but also opportunities for students to integrate what they're learning in school and how that relates to the workplace. Whether it's through shadowing, bringing business people into the classroom, or looking for ways that the business community actually uses math, English, and science, I think there are lots of ways that we can interface the classroom and the workplace.
>
> In our Tech Prep initiative, we have always embraced a work-based learning component, and I know that's not been true for all Tech Prep programs. Work-based learning has been part of the concept of Tech Prep in our area for years. Despite the Tech Prep legislation, I think a lot of

> people have looked at Tech Prep as the secondary/postsecondary interface. I don't think they have really looked at it as educational reform.
>
> In our area, the concept has evolved to be very broad, including the reform of academic and vocational education, integration of academic and vocational education, and the improvement of career planning and guidance. All have to be there in order for the work-based learning piece to be effective. I don't think that we can put students in the worksite who are not academically, vocationally, and attitudinally ready to benefit. (D. Walter, personal communication, December 20, 1994)

Local, State, and Federal Roles in Designing Tech Prep Systems

A strong partnership must develop between the local, state, and federal levels to make Tech Prep and STWO initiatives work together effectively. All of the seventeen experts interviewed agreed that these initiatives should be viewed as avenues to educational reform. Harkin of the U.S. Department of Education recognized the need for strong leadership to guide Tech Prep reform at all levels but especially at the state level:

> Leaders of Tech Prep, in my estimation, must have a clear conceptual understanding of Tech Prep as an educational reform strategy. In order to be able to guide its design, implementation, and evaluation, it is very important for leaders to understand Tech Prep's true potential for effecting long-term educational and organizational change. Tech Prep cannot be viewed as an updated and slightly revised vocational educational program, or a third track for students to follow. Caution and clear thinking are important so as not to weaken this educational improvement strategy.
>
> Leaders must take this conceptual understanding of Tech Prep as a system-wide strategy. It is very important for leaders to know how to incorporate Tech Prep into the state's comprehensive plan for educational reform. I think this is really important because leaders need to look at the larger educational reform movement and its research base for guidance to be able to identify, connect, and build upon other initiatives.
>
> Connecting or bridging various components of the system into a holistic unit will make the educational reform initiative more effective. For this type of reform, leaders are trying to move forward to avoid isolation, to avoid being left far behind. Knowing how to tie to other educational reform efforts is crucial. (G. Harkin, personal communication, February 4, 1994)

Trudy Anderson, Vocational Director for the State of Idaho, described the active role she believes states should play in guiding Tech Prep implementation. Her comments reflect an optimism for the contribution Tech Prep can make to educational reform, especially due to the nonprescriptive nature of the Tech Prep Education Act of Perkins II:

> With the flexibility [allowed in the Tech Prep Education Act], States can put some framework around things. . . . I think Tech Prep has offered all of us around the country an example of what's to come at the federal level. I think we should embrace it because we're not getting all of the structure and guidelines that are very cumbersome, very bureaucratic, [and] involve so much paperwork and time.
>
> Tech Prep offers up a future of what we can expect to see, but only if we realize how different this is from many things we have dealt with in the past. . . . Tech Prep makes it incumbent upon us to write the rules. It's a chance for us to write instead of complain about what's written for us. If we don't pick up the banner and do it, it will fail, and then everybody will revert back to the piles of paper and more regulations.
>
> The state role has to be strong in these initiatives because a local district in a local community or technical college can't make state structures happen. You've got to take a broad sweep of the state rather than pick at it program by program or you'd be at it forever. That doesn't mean you can't have a lot of variation in your curriculum, but you've got to have some basic structure.
>
> When you think about it, that's no different than what we've always said about a four-year baccalaureate degree. There's a certain kind of structure that has to go into that, and yet there is a great deal of flexibility in different programs. You're not building anything any different than a rigorous four-year degree. (T. Anderson, personal communication, January 27, 1994)

Jack Lenz, Tech Prep Coordinator in Ohio, wholeheartedly shares Anderson's view about the need for states to play a strong leadership role in Tech Prep implementation. He is resolute about the need for states to use their influence to institute systemic change:

> Systemic change is critical to the success of Tech Prep in that we are not linking current programs at the secondary level with current programs at the postsecondary level. Tech Prep is not a new name for vocational education; it is not just applied academics, and it is not course by course articulation. We need to develop new options for students that are creative and innovative . . . that will demonstrate to business, labor, parents, students, and other educators that this is not "business as usual." To accomplish this, local consortia need to be given time to work through all the issues and challenges facing this reform initiative. (J. Lenz, personal communication, February 3, 1994)

Using Tech Prep to make systemic change is also important at the local level, according to Judy Mamaras, national Tech Prep demonstration site director in Rhode Island. Sharing her thoughts on Tech Prep and change, Mamaras explained,

> Tech Prep is a program of change. Change doesn't happen easily. You're talking about changing attitudes—which is probably the most difficult—

> changing teaching style, changing expectations, and changing curriculum. It takes a lot of time, and you're going to hit resistance and brick walls. Persist, keep the enthusiasm, work with those people at the secondary and postsecondary level that believe in it, no matter how small that number, and that number will grow. (J. Mamaras, personal communication, December 21, 1993).

Therefore, from the perspective of leaders at all levels, the need for dramatic change in education is readily apparent. Strategies to affect that change must be highly responsive to local and state needs and comprehensive enough to link Tech Prep with other educational reform, especially STWO. In a word, the change must be systemic. To accomplish this degree of reform will require the dedication of leaders at all levels: local, state, and federal. The change will not happen quickly. It will not be easy, but accomplishing the reform is crucial to realizing a preferred future.

INSPIRING THE FUTURE

Many people are investing their time and talents in the potential Tech Prep has to offer to reforming the nation's educational system. However, in the shadow of failed promises of earlier reforms and under the scrutiny of critics, how can Tech Prep deliver what has not been accomplished by previous educational reforms? This section addresses this pivotal question by beginning with a painful but honest admission: The fundamental ideas underlying Tech Prep are not widely known or well-understood. In some cases, Tech Prep itself may be seen as an extension of failed vocational education approaches of the past, presumably providing little for reformers to rally behind to create real or dramatic improvement. Little and Threatt (1992) observed "it is one of the ironies of the past decade's reforms that vocational purposes and programs enjoy only marginal status at a time when reform movements are propelled by the specter of diminishing economic productivity and national competitiveness" (p. 69). To move Tech Prep from the margins of secondary and postsecondary curriculum to the mainstream of the nation's educational reform agenda will require enormous effort and dedication. It will require ensuring that Tech Prep can improve all aspects of the educational system, including what is taught (i.e., vocational, academic, and general) as well as how that knowledge is transmitted.

This section discusses the rationale for creating new Tech Prep systems as well as six core concepts that can provide a foundation for building those systems and presents a

vision of what education can be, a preferred future. To create this vision statement, we engaged in an extensive review of literature on leadership, organizational change, and quality improvement from the standpoint of school and business organizations (e.g., Argyss & Schon, 1978; Bennis & Nanus, 1985; Burns, 1978; Deming, 1986; Kouzes & Posner, 1987). Further, the wisdom of prominent philosophers and scholars from across the disciplines and levels of education were given serious consideration (e.g., Andrew & Grubb, 1992; Commission on the Future of Community Colleges, 1988; Fullan, 1991; Gardner, 1991; Newmann, 1993; Sizer, 1985). Prominent among these was the philosophy of John Dewey; few words could provide more insight or inspiration than his. For us, Dewey's teachings provided a powerful force in shaping our thoughts about the future of education and the contributions that could be made with Tech Prep systems.

Why Reinvent Education?

Educational reforms appear, disappear, and sometimes reappear. Repeatedly, the nation witnesses well-intentioned efforts of time, energy, and money in reform. Some produce improvements; others yield disappointing results. Fullan (1991) comments, "The shame of educational change is the squandering of good intentions and the waste of resources in light of personal and societal needs of great human consequence" (p. 345). Why do reform initiatives come and go? Why do so many fail to become a part of the permanent fabric of education? Cuban (1988a) reports that similar reforms surface repeatedly because they have either "failed to remove the problems they were intended to solve, . . . [the] problems and solutions are [sic] mismatched, . . . [or the] problems were instead persistent dilemmas involving hard choices between conflicting values. Such choices seldom get resolved but rather get managed" (p. 329). In effect, Cuban explains that often changes are attempted without changing the fundamental ways in which systems are configured. Solutions are applied piecemeal without considering their ramifications to other parts of the organization. In order to make dramatic changes, the entire educational system must be better understood from the perspective of the whole, not just its disparate parts. To do that, it is valuable to examine the origins of the nation's educational system, particularly the relationship between vocational education and other aspects of the curriculum.

A Voice from the Past Provides Wisdom for the Future

In the early 1900s, vocational education emerged as a subject area to be included in public education. Industrialization rapidly changed the nature of work, and schools sought to include not only the content needed to prepare the future workforce but the methodology to educate larger numbers of students entering public education. A common belief of the time was that the education that prepared students for work should be set apart from traditional education in its philosophy, pedagogy, and physical proximity (U.S. Department of Education, 1993).

A voice that spoke of the potential ramifications of separateness was John Dewey's. He strongly advocated an educational system that could establish connections between curriculum areas within schools, and between schools and their communities. He argued that to ignore or limit the contributions of any individual would result in inadequate educational preparation of students, the ultimate waste (Dewey, 1915). Instead, he saw the role of education as one that could prepare students for productive membership in their communities and the larger society. To do that he believed that education must be connected to democratic principles. Whereas he recognized that divisions of labor exist, he opposed any replication of that hierarchy within schools. In 1915, Dewey wrote of the potential of using work as the context for creating more democratic education for all students:

> The world in which most of us live is a world in which everyone has a calling and occupation, something to do. Some are managers and others are subordinates. But the great thing for one as for the other is that each shall have had the education which enables him to see within his daily work all there is in it of large and human significance. (pp. 21-22)

Although his philosophy of education did not focus exclusively on either the vocational or academic, he did believe in education that could interrelate "theory and practice, body and mind, mental states and the world" (1916, p. 306). Dewey believed that the vocational aspects of life were central to learning. In 1916, he wrote, "An occupation is a continuous activity having a purpose. Education through occupations consequently combines within itself more of the factors conducive to learning than any other method" (p. 309). By involving "work" in learning, a philosophy of general education could be created, even today, that could be considered preparatory for the multiple life roles played by adults.

Dewey (1915) addressed the ideal context in which to place vocational education by cautioning "whenever we have in mind the discussion of a new movement in education, it is especially necessary to take a broader, or social view" (p. 4). He wrote that vocational education should not be "distinct studies" but taught in such a way that they make schools "a genuine form of community life instead of a place set apart in which to learn lessons" (p. 11). Dewey's disdain for the isolation of any aspect of the curriculum or of schooling from the community in which it is imbedded, is apparent in the following statement:

> From the standpoint of the child, the great waste in the school comes from his inability to utilize the experiences he gets outside the school in any complete and free way within the school itself; while, on the other hand, he is unable to apply in daily life what he is learning at school. That is the isolation of the school—its isolation from life. (p. 67)

Choosing an Alternate Path

In spite of the progressive philosophy put forth by Dewey of an integrated approach to education connecting in-school education with learning about vocations and cultural life, schools chose another option. They adopted methods and curricula for preparing students for work in factories and on the farm that were removed from the methods and curricula developed for students seeking higher education (U.S. Department of Education, 1993). This separation contributed to divergent educational paths that exist as tracks (i.e., vocational, college, general) in schools today. Vocational education has not enjoyed the same prestige and respect as other curricula, particularly the college prep curricula. Recently Gray (1994) posed the question of whether Tech Prep will overcome problems inherent in the vocationalism of the past, including tracking. He was optimistic about the potential of Tech Prep to contribute to reform if given a real chance. His concerns, however, surrounded whether Tech Prep will be given the support necessary to reach full-scale implementation. Will Tech Prep get the chance to be the kind of education that students and parents associate with greater opportunity? Will it contribute to overcoming school tracking of students into disparate and unequal futures? We believe that it must become a legitimate vehicle to systemic change.

Tech Prep should not be a party to any practice that unequally guides the economic fate of students. Such practices do a disservice to students and ultimately jeopardize the nation's democratic society. If Tech Prep is merely a replacement for the college, vocational, or general track, thus becoming a track itself, it will perpetuate the dual educational system currently offered students. Rather, the benefits of Tech Prep should go

to *all* students who desire to access them. Tech Prep should help students understand the natural connection of head and hand, theory and practice. It should be inclusive, not exclusive. Although many local consortia have targeted certain percentile ranks of students as the ideal Tech Prep student (Bragg et al., 1994; Office of Educational Research and Improvement, 1994), no other label than *all* should be attached to students who have the potential to gain from it. Where an inclusive approach is adopted, it will be difficult to distinguish Tech Prep from college prep as both include relevant and challenging curricula, offering graduates further opportunity in education and employment, and greater personal satisfaction.

Connecting Learning in School to Learning out of School

Curriculum integration, formal articulation, and strong connections between in-school learning and out-of-school learning are vital facets of Tech Prep. If carefully designed, these strategies can help bridge the gulf between theory and practice with the goal of empowering students with the requisite knowledge and skills needed to adapt to the rapidly changing world, including the world of work. Nearly eighty years ago, these connections were recognized by John Dewey (1916) as well:

> An education which acknowledges the full intellectual and social meaning of a vocation would include instruction in the historic background of present conditions; training in science to give intelligence and initiative in dealing with material . . . and study of economics, civics, and politics, to bring the future worker into touch with the problems of the day and various methods proposed for its improvement. Above all, it would train power of readaptation to changing conditions so that future workers would not become blindly subject to a fate imposed on them. (pp. 318-319)

Heeding Dewey's cautions, Tech Prep systems should incorporate school-to-work components that are designed very carefully. Leaders who contemplate creating school-to-work opportunities need to recognize difficulties inherent in these ventures. Still relevant today are these words spoken by Dewey in 1916:

> [T]his educational reorganization cannot be accomplished by merely trying to give a technical preparation for industries and professions as they now operate, much less by merely reproducing existing industrial conditions in schools. The problem is not that of making the schools an adjunct to manufacture and commerce, but of utilizing the factors of industry to make school life more active, more full of immediate meaning, more connected with out-of-school experience. (p. 316)

Similarly to Dewey's times, today's efforts to reform education must reconceptualize education in a way that encourages all students to "develop a courageous intelligence, and to make intelligence practical and executive" (p. 319).

Tech Prep Systems as Second-Order Changes

Through approaches to school and work, progress can be made to improve education. However, if these strategies are the only ones adopted and labeled Tech Prep, educational reform will not occur successfully. Often, innovations such as school-to-work transition and vocational and academic integration are implemented as first-order changes, single innovations that alter structures within schools but have little effect on changes outside of schools (Cuban, 1988b). Insightful educators recognize the relationship between educational reform and societal reform (Fullan, 1991). Even though there are limits on the extent to which education can influence the economic and societal fate of students, what is done in schools must foster possibilities, not limit them.

The extent to which educational change not only makes a difference in the lives of students but also in society is a second-order change (Cuban, 1988b). Second-order changes are those that "alter the fundamental ways in which organizations are put together, including new goals, structures and roles" (Fullan, 1991, p. 29). Second-order changes do not occur to parts of a system, but to entire institutions and to the people that inhabit them. Implementation of second-order change is complex because of the enormity of coordination required to fit various systems together. Within education, second-order changes require integration of ideas and people to avoid superficial changes that disappear when personnel change or funding ends.

If Tech Prep is to become an educational reform strategy of the importance envisioned by the national leaders quoted throughout this document, then it must be conceptualized as a second-order change. The federal STWO legislation has provided the impetus for re-examination of many first-order innovations commonplace in schools today. These are important reforms; however, in isolation, they do not go far enough. Tech Prep systems as vehicles to educational reform can provide an umbrella under which to congregate innovations such as authentic instruction, vocational and academic integration, school-to-work transition, outcomes-based education, and alternative assessment. This umbrella must be sturdy and broad enough to weather the storm of blending such diverse

innovations into a comprehensive strategy for systemic change. We believe six core concepts provide the ribs of this umbrella.

Six Core Concepts of Education Utilizing Tech Prep Systems

According to Deming (1986), an organization's central activity should be viewed from a system's perspective. Innovation begins with processes, policies, and practices, and must ultimately impact the whole system. Deming's message for reforming any system is that by focusing on the whole, organizations are better able to guide innovation and perpetuate continuous improvement. In this section, six core concepts are discussed that represent an evolution of earlier ideas about Tech Prep. We believe that the ideas associated with any innovation must not become rigid or unresponsive. Rather, to be effective, improvement demands continual reformulation. The six core concepts presented here are not completely consistent with previous notions of what Tech Prep should be nor do these concepts describe the vast majority of programs that currently exist as Tech Prep. In fact, they do not describe *programs* at all, but a collection of *processes* necessary to build a new system of education, the kind of system that can contribute to a renewed commitment to improved quality in education for all students.

First Core Concept

Tech Prep should be grounded in an integrated and authentic core curriculum that spans education levels, at minimum the secondary and postsecondary levels. Integrated and authentic curriculum and instruction must not only provide a more meaningful approach to teaching and learning but stop the perpetuation of tracking.

If Tech Prep could help educators, students, and parents see that the values of vocational and nonvocational (academic or general) education have less in conflict and more in common, it seems likely that the chances for lasting reform could be improved. To create this sort of core curriculum, an integrated and authentic (i.e., real-world knowledge, skills, and attitude) core curriculum, a more student-focused, project-based pedagogy should be used that is distinctly unique from the traditional didactic, teacher-centered pedagogy well-known in high schools and colleges today. Rather, vocational and academic education should be reinforced and blended to create core curriculum and instruction that is highly practical and motivating. This curriculum should borrow its

structure from career academies, cluster schools, and other approaches dedicated to integration that have the potential to impact all students (Andrew & Grubb, 1992; Grubb, Davis, Lum, Plihal, & Morgaine, 1991; Stern, Raby, & Dayton, 1992). Interdisciplinary curriculum design principles being adopted in the middle schools are increasingly used as models for secondary school reform (Jacobs, 1989). Imbedded within these curricular designs are team teaching strategies, interdisciplinary problem-based projects, and team-based cooperative learning approaches intended to make learning more active and realistic for students.

Beginning at the secondary level (or earlier), an integrated and authentic core curriculum should be designed to ensure as progressively rigorous an education as has occurred traditionally with college prep studies. The secondary curriculum is designed to center around academic subjects such as math, science, and communications, all intimately connected to broad career cluster areas. With Tech Prep, an integrated and authentic core curriculum should not be confined to the secondary level, but, rather, it should reshape the postsecondary curriculum as well. At the two-year college level, the core curriculum should become even more academically rigorous and specialized in an occupational area yet still remain connected with the broader context of civic life. As was recommended in ***Building Communities*** (Commission on the Future of Community Colleges, 1988), the curriculum of community colleges must also "assure that they can develop up-to-date programs that integrate the core curriculum and technical education" (p. 21).

Second Core Concept

Tech Prep should link at least secondary and postsecondary education—but optimally kindergarten through lifelong learning—to facilitate smooth transitions, reduce failure and drop-out rates, and reduce costly inefficiencies for students. It should increase educational and employment options for students and must not be terminal.

Since the notion of 2+2 core curriculum ensures a sequencing of courses and/or programs from the secondary to the postsecondary level, Tech Prep can be an effective way to help students who have not contemplated continued education see a reason for it. Formal articulation can help students make the often difficult transition into college by helping them to be more academically, technically, and emotionally prepared. In accomplishing this goal, Tech Prep may help reduce the growing incidence of remediation of new college students by raising academic standards during the secondary (preparatory)

phase. This achievement would benefit secondary and postsecondary schools. A more highly academically prepared pool of high school students could lead to a more constant stream of enrollments at the postsecondary level of "younger, full-time students with fewer educational disadvantages" (Kazis, 1993, p. 5). In turn, this could contribute to higher quality postsecondary education.

Sometimes formal articulation to the postsecondary level provides college credit to students for courses taken prior to completion of high school, encouraging them to continue to the postsecondary level. Another potentially more beneficial approach is advanced curriculum articulation that provides more rigorous vocational and academic competencies at both the secondary and postsecondary levels. A benefit of this type of articulation is an opening of doors to an even wider array of careers because of the opportunity to develop more advanced competencies throughout the entire 2+2 educational experience. Of course, beginning this program of study much earlier than the eleventh grade is advocated by many Tech Prep leaders (Bragg et al., 1994). Articulation is particularly advantageous when seeking to connect Tech Prep programs to four-year college baccalaureate programs. Eventually, through formal articulation among secondary schools, two-year colleges, and four-year colleges, Tech Prep may become a powerful force in eliminating the "terminal" stigma of postsecondary vocational education by preparing students for the demands of further higher education.

Third Core Concept

Tech Prep should be a highly relevant approach to teaching and learning. Work-based learning provides a valuable tool to create this approach through active use of the workplace and surrounding community in education that is strategically connected to the labor market.

Again, building upon an idea advocated nearly a century ago by John Dewey, school-to-work opportunities should be designed to link learning in the school setting to the genuine laboratory of the workplace and community. The gulf between theory and practice in high school curriculum is increasingly recognized as detrimental to educating all students (Gardner, 1991). Rather than perpetuate current practices, school-to-work opportunities should build a bridge to connect the theory and practice inherent in both vocational and academic education. This approach can support Dewey's philosophy of education by engaging students in reflection upon practical human experiences, "the shared practices of

community that are the roots of human learning" (Wirth, 1992, p. 182). This notion of "shared practices" is pivotal when learning is centered on the relationships between and among occupations and such life-fulfilling processes as health, communications, politics, and religion.

To maximize their work-based learning experiences, students should be provided opportunities to observe and experience "all aspects of the industry," as is advocated in both the Perkins II and STWO legislation. Work-based learning experiences should support exploration of careers within various work settings. These experiences can be highly workplace intensive using formal apprenticeships or professional/clinical experiences, or they can also provide a balance between school and work through internships or cooperative education. Any of these approaches can be enhanced by using individualized career plans that outline how vocational and academic knowledge and skills can be integrated with work for individual students. Regardless of the particular approach, Berryman and Bailey (1992) suggest effective work-based learning should deliver effective and efficient instruction, reflect the demands of the workplace, deliver broadly applicable knowledge and skills, and bridge the gap between vocational and academic education. Ultimately, at the conclusion of postsecondary education, students should be prepared to enter their chosen career fields. However, the system must continue to support the diversity of lifelong learning necessary throughout adults' working lives.

Fourth Core Concept

Tech Prep should be an approach that focuses on outcomes and increased student performance, and supports other outcomes-based initiatives such as the Perkins II and the Goals 2000: Educate America Act.

Outcomes-focused curriculum can help to establish Tech Prep as a standards-driven, performance-based educational system. This core concept is intended to ensure graduates have the competencies to be successful in attaining their desired goals, whether they be immediate employment, two-year or four-year college, or another option such as a formal apprenticeship, work, or the military. In a recent study of local Tech Prep coordinators, fifteen outcomes were given a high or very high priority rating, reflecting a wide range of preferred outcomes for students (Bragg et al., 1994). Among these fifteen were outcomes pertaining to vocational and academic competency attainment, workforce preparation, employability, and interpersonal skills. To ensure that these student outcomes

are reached, alternative learner assessments should be utilized. Tech Prep is bound to engage students in authentic and performance-based learning that will demand alternative approaches to learner assessment (Dornsife, in press; Whichard & Cobb, 1993). Project-oriented assessments, portfolios, and performance-based assessments can make important contributions to the teaching and learning process.

Beyond the mandates of performance-based assessment, a focus on continuous improvement should be a top priority. This necessitates ongoing local evaluation that is highly sensitive to changing measures of quality for programs and all the individuals associated with them (e.g., students, faculty, employers). Tech Prep should capitalize on incremental change by using information-driven feedback loops that point to needed modifications and enhancements. The mind set that educational reform throws out old ways, starting always at ground zero, should be eliminated. An emphasis on systemic change is essential to enhancing educational quality over the long-term:

> Improvement cannot be a one-time effort or project. . . . Improvement is not achieved by focusing on results, but by focusing on improving the systems that create the results. (Monk, 1993, pp. 20-21)

Continuous improvement is critical to meeting the needs of all who are active participants in the nation's ever-changing educational system and increasingly recognized as pertinent to reforms involving vocational education (Bragg, 1992; Stone, Madzar, Cagompang, & Smith, 1993).

Fifth Core Concept

Tech Prep should be an accessible and viable option for all students. It must not be a program targeted to a certain class rank percentile group but must offer an educational option that is rigorous and stimulating for any student who chooses it.

A fifth core concept is directed at ensuring that Tech Prep is an educational vehicle accessible to all. We respect the hopes of concerned people who are looking to Tech Prep to be an avenue to make a difference for a previously "overlooked" group of students—we are concerned for those students as well. However, Tech Prep should become a vehicle that can improve education for all. The impetus for Tech Prep originated from education leaders and policymakers who recognized the system was failing a "neglected majority" of high school youth (Parnell, 1985; William T. Grant Foundation, 1988a, 1988b). They

could see that an education that underprepares any group of students affects not only the students and their schools, but their communities, and eventually the entire nation.

While the "neglected majority" should continue to be a primary beneficiary, Tech Prep should be reconceptualized in such a way as to benefit students who appear at any point on the academic ability continuum, including those above and below the middle 50% (NCRVE, 1992). To neglect the top 25% of students places Tech Prep in a subservient role to college prep; to neglect the bottom 25% suggests Tech Prep is too good for them. Addressing this issue, Hayward suggests,

> This ought not pit college prep against career prep [Tech Prep]. . . . The notion is to blur the distinction between college prep and career prep tracks. Eventually, we'd like to see all students in a place where they're receiving high quality instruction with high quality skills. (NCRVE, 1992, p. 8)

If the idea of inclusive education is to become a reality, Tech Prep curriculum must do more than acknowledge the diverse nature of learners. It must *value* the diversity which individual students bring to the learning process. Tech Prep should support men and women in their academic pursuits and in their exploration of nontraditional careers. It should also encourage and support students with academic or economic disadvantages to progress farther in school than they have traditionally gone. To facilitate student access, opportunity, and success, various support systems must be made available. Early preparatory and developmental services should accommodate learner needs of an academic, career, or personal nature. Guidance and counseling services are needed to carry out assessments, distribute career information, facilitate career exploration, and provide job placement. The intent of any of these services is to assist more learners to obtain their desired outcomes and meet and surpass high performance standards.

Sixth Core Concept

Tech Prep should be implemented by using a highly collaborative approach built upon the network of people and organizations that form local consortia.

Collaborative implementation is essential to ensuring that the preceding five core concepts operate effectively together. Collaboration can occur when the goal of enhancing student learning is the central focus of implementation efforts. Innovative leaders of Tech Prep should break down the barriers between the many diverse groups that share the desire

to improve education but often lack the communication systems to expose, share, and develop common interests. Vocational and academic educators must collaborate to deliver integrated educational experiences. Faculty, counselors, and administrators need time in their workdays to meet with business leaders who also agree to take a more active role in the educational preparation of their future employees. Counselors need to be included in planning and implementation, so they can more readily develop ownership in the educational preparation of the students they advise. In order to focus on career development, counselors must become more than schedulers and crisis managers. All of these groups must have a stake in the evolution of Tech Prep.

Joint planning, development, and implementation involving each of these groups is essential to overcoming a commonly perceived barrier—turf battles (Bragg et al., 1994). The Tech Prep Education Act mandates a shared responsibility among educational organizations and interested groups such as business, industry, and labor, parent groups, student groups, and community-based organizations. The consortium arrangement required by federal law provides a formal structure for collaboration among these groups. An effective consortium can establish a broad base of ownership for Tech Prep (Key, 1991). A consortium creates the blueprint and lays the foundation for Tech Prep's implementation, ongoing operation, and continual improvement. Active exchanges of information inside and outside of the educational environment can help to promote the changes inherent in Tech Prep and ensure that curriculum developed for it is relevant and well-supported.

For the many individuals charged with implementing change, an environment where change is possible must exist. Collaboration is vital to that environment. Leaders have the responsibility to embrace change as an inevitable and necessary process that facilitates improvement. By using change to an advantage, educators can "exploit change before it victimizes us" (Fullan, 1991, p. 345). Tech Prep is a sensible process to implement the changes being called for from those within and outside of school walls. Around the country, many leaders of Tech Prep are embracing change and forging new paths for others to follow.

Definitions and Philosophies of Tech Prep Leaders

Beyond the historical and philosophical perspectives, the authors' vision of education was also influenced by the perspectives of contemporary leaders, many of whom are practitioners, scholars, and policymakers within the educational community. Among these individuals were the seventeen leaders who graciously shared their words of wisdom on the purpose, meaning, and future of Tech Prep. During telephone interviews, these seventeen leaders were asked to describe Tech Prep in a few short sentences and provide advice for those beginning the implementation journey. While almost all of them reported that this was a difficult thing to do, all provided insightful responses. (See Appendix A for background information on each expert quoted in this section of the document.)

As you will see, the leaders' responses were quite diverse, offering unique perspectives about what Tech Prep is and what it ought to be. Some clearly reinforced the six core concepts of Tech Prep previously discussed; others did not. Yet, in all, it was possible to get a sense of the vision, commitment, and enthusiasm for the future of Tech Prep held by this group. Listed below are the leaders' responses in alphabetical order by last name:

> Tech Prep is a method of expanding options, not a one-way track. In California it is a 2+2+2 [option]. Students can go on to four-year [higher education] institutions. Also, it's not limited to one group of students. It's important that we not ignore the section of legislation requiring attention to *all* students. Our study [since 1987] that has followed student results shows that no matter what the student background or percentile rank, those who attended Tech Prep are more likely to be employed today.
>
> Laurel Adler, California, December 15, 1993

> Tech Prep is a four-year sequential program leading to a technical certificate or degree, and in our state that's a culmination of an associate of applied science degree. Tech Prep requires integration of vocational and academic education at both the secondary and postsecondary level. It's intended to provide a more rigorous curriculum, a four-year sequenced curriculum, that provides a skilled employee whose preparation has been more rigorous than would normally be expected from a two-year associate degree graduate.
>
> Our Tech Prep movement is a major key in the state school restructuring initiative. We're feeling very positive about it. That doesn't mean that we have seven or nine real flashy programs to show off. That means we're moving the whole state or a very big chunk of the state forward in quite a

structured way. And we feel that school-to-work is going to fit right into that.

Trudy Anderson, Idaho, January 27, 1994

Tech Prep is a sequence, at least a sequence of courses through high school into the community college, that blends . . . the academic and vocational courses and prepares students for a technical career area. . . . What Tech Prep is to us . . . is a way to get kids focused on some kind of a career area.

Mary Byrski, Maryland, December 21, 1993

When I describe it to folks who are hearing it for the first time, I make it clear that there are two basic focal points for Tech Prep. One, it's an educational reform movement that involves applied academics which takes academics from the desk to the shop, to the lab, to the workplace, to wherever you can apply them and actually brings application examples into the classroom as well. It also involves combining technical curriculum with academic curriculum, so math is not a disjointed subject of abstract facts that some student has to learn and repeat two or three times a week in order to get a grade at the end of the week, and then again at the end of the semester. . . . It is now a set of materials and information that's basically a library of mathematical information to be used to solve real life problems or applied problems developed through the Tech Prep curriculum. That's really the first major aspect of Tech Prep.

The other side of Tech Prep is the 2+2, which requires students to make a decision at the eleventh grade that they plan to pursue a technical education and enroll in courses over the last two years of high school which are designed to prepare them to move smoothly into a postsecondary program of study. But many more will benefit from the changes that I referred to earlier in terms of making Tech Prep the base upon which other programs can stand and because it will eliminate the general course of study.

There are really only two responsible things that we can offer students in high school today, a college preparatory program or a technical preparatory program. And if they take one of these options, they will essentially learn the same level of competence in math, science, and communications. The differences will only be how they learn it, whether they learn in an applied fashion through Tech Prep or in a theoretical fashion through the traditional college prep approach.

Gary Crocker, Maine, January 21, 1994

To me the most important concept that I try to communicate is that of Tech Prep as a reform strategy, as an educational restructuring strategy. So Tech Prep, to me, is one of the ways that we can meet the need for fundamental change in American education. Tech Prep is providing the answers for preparing American youth for the evolving workplace.

As I look at Tech Prep, I would describe it as a single program of study. The sequence of courses is very important. Articulated curriculum is very important. The single program of study that builds upon competencies is needed for employment. It's a combination of practical application of a student's coursework, context specific, experiential mode, [and] integration of vocational and academic education. It is opening doors to students by providing them with a focus, and a very clearly defined curriculum path that leads to productive employment in a highly skilled technical occupation.

Tech Prep is designed to address the student's transition from secondary to postsecondary and further education by formally articulating these levels and institutions. I think that's probably one of the biggest innovations within Tech Prep, that whole idea of formally articulating the levels, secondary and postsecondary levels, and the institutions to make that transition easier for the students.

Gisela Harkin, U. S. Department of Education, February 4, 1994

Tech Prep is a process that enables our students, while they're in high school, to take identified courses on a certain track and receive community college credit. Seattle has been into this since '87 or '88, and we're still working on it. So it does take a long time, and even though your grant may cover two or three years, you're not going to get it done in that time, and you'll have to go further.

Malver Haynes, Washington, January 20, 1994

One of the other things I've found is that we don't ever talk about Tech Prep as a program for a few kids or for the middle 50%. I wish that lingo had never been created—the middle 50%—because we have people take that so literally that if a student happens to be in the eightieth percentile, he's not allowed in, because people take it so literally. We've also taken the word 'program' out. By program, we have found that people think that it is for some kids and not for others, and programs come and go. So, we hope that this is a reform movement, not designated just for this group of kids in the middle 50%, [not] such a rigid definition. So we call it a process, rather than a program. And we don't have program anywhere in our literature.

Carla High, Oklahoma, December 15, 1993

There are really three things that characterize Tech Prep. Number one, the career focus in education. The second thing is technical education. It's much different from vocational education. It's technical education with a strong academic foundation which means a totally new curriculum. The third one is an emphasis on education and training opportunities beyond high school.

It does imply that we're eliminating the general track, that we're improving on teaching and learning through contextual approaches, that we're shifting

from 2+2 to 4+2 and beyond. We're not closing student options, we're not tracking students, but we're trying to open their options.

Dan Hull and Julia Vitale, CORD, February 1, 1994

One thing I do try to get across to everybody is that it is an economic development issue. We're preparing students for the workplace of tomorrow. Another point that I always try to stress is the partnerships that we have to build between secondary and postsecondary, academic and vocational, and business and industry. . . . This just doesn't happen overnight, so I try to stress to people, don't look for an instant quick fix. This is a long-term process. It's change over time.

Carol Laughlin, Alabama, February 3, 1994

Tech Prep develops educational programs to prepare students for the technical jobs of the future. Those technical jobs require high levels of math and science and communications, require a two-year technical degree or two-year technical certificate. . . . We talk about Tech Prep in Ohio as a combined program of secondary and postsecondary education [levels]. It requires occupational employability and academic competencies at both levels.

Jack Lenz, Ohio, February 3, 1994

Tech Prep is another choice that high schools can offer students. I don't look at it as an alternative, as something that's less than. It's another choice, and I think that's really very important. It's a program that gives students focus and direction, whether they know what they're going to do when they graduate or not. It doesn't matter. It helps them make the most of their time while they're in high school, to get that academic base that they need, so that when it comes time for them to make some decisions, they've got the skills to go on. . . . It's a program about options and it helps students. . . . And I think that it's not only preparing students for the 21st century, but it certainly is going to be responding to the economic needs of this country.

Judy Mamaras, Rhode Island, December 21, 1993

Tech Prep is a major high school restructuring initiative of the state board of education. If high schools don't do any major restructuring, they really can't have an adequate and effective Tech Prep program. Tech Prep provides students with knowledge and skills required for designated Tech Prep occupations, and it provides them with work-based credentials, work experience, and transitions to employment.

Structurally, Tech Prep is an articulated secondary and postsecondary program that leads to an associate degree or an occupational certificate. It involves a clearly defined sequence of academic and vocational-technical courses which have to be progressively vigorous. The minimum stated in Perkins is the last two years of high school and two years of community

college. But, in Illinois, it potentially can be 4+2+2, because we think you really can't start this program in the eleventh grade. . . . A requirement of all of our career pathway programs is that schools think through how students have options to move from one pathway to another. Starting Tech Prep at the eleventh grade limits the student's options.

Dick Miguel, Illinois, February 10, 1994

Tech Prep is a way of turning students on to learning and bringing meaning to what they're doing. . . . [It makes] them recognize that they're important and that they have value, and that they have a significant role to play in our culture.

Jack Miller, Oregon, December 17, 1993

Number one, the pedagogical and philosophical base of the Tech Prep program is applied learning. People need to understand that [it is] bringing knowing and doing together. Or, to say it another way, bringing content together with the context of application. [I]t was designed to combine high school and postsecondary, whether it's community college, technical school, apprenticeship, or directly into work. . . . [It is] a combined program that has a lot of structure to it . . . a lot of academic substance, as well as vocational substance.

Students would generally start this in grade eleven and it would be a four-year program. . . . That's the way I designed it originally. Many places say [they] want to hook grades nine and ten into it, and make it a 4 + 2 program. I don't really care how that works, except that . . . in order to be a bona fide Tech Prep program, you need to bring the postsecondary and secondary school folks together to design a structured and substantial program with a very clear focus.

Dale Parnell, Oregon, January 24, 1994

I always get into that [defining of Tech Prep] on the airplane, . . . [I] sit down beside somebody, and they'll say, 'What do you do?'. . . And there's this gray-headed woman struggling with this heavy briefcase . . . and so I say, 'Well, we're working on a course of study that will serve the middle group of students in our society who typically have been poorly served, to make sure they have a good academic background and have a technical skill, and that they get an education, at least an associate degree in an applied science. . . because we believe that's what the workplace needs.'

That's what we're all about. These children have typically just floated through with nobody monitoring . . . what they were doing . . . [T]hat means we expect them to master a stronger math and science and communication skill curriculum, as well as get headed somewhere in the technology area. . . . [T]hat's common sense. People usually understand and [say], 'Oh yeah, . . . that needs to be done.'

Myrtle Stogner, North Carolina, December 22, 1993

> It is a process as well as a program; it is a way of reforming and enhancing the curriculum both in terms of the occupational and academic curriculum, at both the secondary and community college level. It's a way of improving the transition mechanism for students as they work across levels of education and as they blend the classroom and workplace in meaningful ways.
>
> Diana Walter, South Carolina, December 20, 1993

IMPLEMENTING TECH PREP SYSTEMS

The job of transforming Tech Prep from a good idea to a reality is enormous. Similar to taking a custom-built home from a dream to a fully-completed structure, Tech Prep implementation takes a great deal of careful planning, commitment, and hard work. This section describes perspectives, processes, and strategies that can be used to plan, implement, and evaluate Tech Prep. Beginning with the task of "Engaging Local Leaders and Stakeholders," we consider the importance of the people involved in the implementation process, and the strategies used to engage their full commitment to this venture. Next, we consider the important task of "Drafting the Plans" by creating the shared vision, mission statement, goals, and policies. The third section focuses on "Building the Systems." It defines twenty specific components and five approaches taken by local consortia to configure components into Tech Prep systems. Included in this section is a discussion of the barriers that are inevitable with any initiative as complex and demanding as Tech Prep. Finally, a perspective on evaluation of Tech Prep is provided, labeled "Measuring Progress." This section focuses on the importance of this too often neglected activity and touches on the areas of program evaluation and continuous improvement. Together, this part of the document describes much of the essential information local consortia need to devise Tech Prep systems that can also make a significant contribution to restructuring education.

Engaging Local Leaders and Stakeholders

Present and future leaders of Tech Prep will face many challenges. They will be expected to stimulate educational reform by integrating vocational and academic education. They must also find ways to create valuable work-centered, experiential approaches to teaching and learning. To effectively address these and many other complex activities,

leaders must act individually and interdependently as innovators, change agents, facilitators of group processes, and competent project managers: "The leader's primary contribution is in the recognition of good ideas, the support of those ideas, and the willingness to challenge the system" (Kouzes & Posner, 1987, p. 8). Tech Prep represents an important educational leadership challenge. Care must be taken to involve leaders throughout the educational system and the broader community to ensure that it becomes a viable approach to restructuring education and ensuring systemic change.

Qualities of Local Leaders

Leadership is crucial to the success of Tech Prep. Where it is absent or superficial, Tech Prep cannot flourish. Whether or not the goals of a new Tech Prep initiative can be accomplished depends a great deal upon the credibility of a leader's actions. Kouzes and Posner (1993) note,

> Credibility is how leaders earn the trust and confidence of their constituents. It is about what people demand of their leaders and the actions leaders must take in order to intensify their constituents' commitment to a common cause. (p. xvii)

Based on leadership research from the constituent's perspective, Kouzes and Posner (1993) identify the following six disciplines of credibility:

1. Discovering yourself
2. Appreciating constituents
3. Affirming shared values
4. Developing capacity
5. Serving a purpose
6. Sustaining hope

Evident in these disciplines is the fact that leadership is not something to be developed overnight or through reading a book. It takes time and practice. It takes a set of principles that is sustained and evident over time, no matter what.

Who are the leaders of Tech Prep? How do they exhibit the disciplines of credibility? Certainly they include Tech Prep coordinators, as well as individuals who hold formal administrative positions in secondary and postsecondary education such as school principals and superintendents or community college deans and presidents. However,

leadership is not restricted to those who hold official titles. All individuals involved in planning and carrying out Tech Prep, regardless of their position, must provide leadership to ensure success. By developing a thorough understanding of one's own values and aspirations for education, these individuals can muster the support of diverse groups for Tech Prep and heighten the credibility of an initiative.

Although not specific to Tech Prep, Fullan (1991) described the importance of getting individual faculty and staff involved in leading and managing educational change. He indicated that leaders must continually act and interact in deliberate ways to ensure the success of any new educational innovation. To ensure this interaction, he sees the need for a collaborative work environment where people can share successful practices, provide support to one another, encourage experimentation, and maintain constant and effective communication.

Fullan (1991) also described the importance of leaders creating a shared vision that accommodates different views and perspectives, and facilitates an evolutionary planning process that can improve the fit between educational reform and local conditions. These actions are best accomplished by empowering individuals to become part of the change process in addition to providing professional development to ensure that they acquire the new skills, knowledge, and attitudes needed to contribute to the reform. Carol Laughlin, state Tech Prep coordinator in Alabama, described leadership for Tech Prep this way: "You can't lead the charge and turn around and see who's following. You have to stay behind the pack and keep pushing as much as you keep charting [the course] ahead" (personal communication, February 3, 1994). Leaders must constantly monitor change and determine whether efforts at restructuring policies and processes are having a desired effect. To do so, they must have a thorough understanding of the needs of followers, encouraging them to take on leadership roles to support Tech Prep.

Individuals who consistently demonstrate these behaviors are referred to as transformational leaders (Bennis & Nanus, 1985; Burns, 1978). Tichy and Ulrich (1984) describe transformational leadership as having three identifiable parts:

1. Creation of a shared vision;

2. Mobilization of commitment of key constituents (referred to here as stakeholders) through dialogue and information exchange; and

3. Institutionalization of change demonstrated through new patterns of behavior within participating organizations.

Transformational leadership is imperative if Tech Prep is to be a serious contributor to restructuring education and systemic change.

It is impossible to list all of the actions leaders should take for Tech Prep; however, Dornsife (1992a), Hoerner, Clowes, Lachowicz, Wehrley, and Hammons (1992), Key (1991), McKinney et al. (1988), Warmbrod and Long (1986), and others have identified numerous leadership strategies important to Tech Prep implementation. These strategies include the following:

- Developing a shared vision that continually evolves to meet the needs of the local area
- Gaining commitment from executive-level administrators as well as the active involvement of individual leaders (e.g., students, faculty, counselors) at each participating organization in a consortium
- Using a team approach to engage the many stakeholders in planning and implementation activities
- Building relationships based on trust and respect to counter the tendency toward turfism
- Rewarding individuals for carrying out collaborative efforts to design, develop, and implement new ideas
- Ensuring all individual leaders participate in professional development opportunities
- Establishing open, frequent, and clear communication
- Providing time and compensation to participants
- Modeling an openness to change

Local Tech Prep Coordinator Roles and Responsibilities

Individuals who have formal responsibility as Tech Prep Coordinators (or Directors) have a particularly important role to play. In a study examining the competencies needed by Tech Prep coordinators, Bragg (1991) classified leadership skills and knowledge in the following four areas:

1. *Educational expertise* such as developing integrated curriculum; creating articulation agreements; and planning, implementing, and evaluating educational programs
2. *Change leader expertise* such as initiating new activities, recruiting stakeholders, stimulating the planning process, creating alternative approaches, and supporting innovation
3. *Facilitator expertise* such as organizing and guiding teams, establishing a climate of trust, resolving conflicts, and linking people with information and resources
4. *Project manager expertise* such as organizing and coordinating meetings; selecting, orienting, and supervising staff; preparing and monitoring budgets; and conducting follow-up visits

Several of the national experts we interviewed spoke of the importance of the local Tech Prep coordinator in guiding a consortium. Diana Walter, coordinator of a national Tech Prep demonstration site in Pendleton, South Carolina, spoke of the multifaceted role of a local coordinator:

> The role of a coordinator is to work within the system and act as a resource person, a liaison, a catalyst, a friend, a prodder. They must take this concept and run with it, and weave it into the very fabric of the secondary and postsecondary institutions. Because if that doesn't happen, if the funding goes away, and there would be no Tech Prep coordinator, there probably would be no Tech Prep program. (D. Walter, personal communication, December 20, 1993)

Gisela Harkin of the U.S. Department of Education and Carol Laughlin, state Tech Prep coordinator in Alabama, both spoke of the important role played by local coordinators. They explained that local coordinators need to be an immediate change agent, in addition to maintaining a long-term commitment to improvement:

> Leaders must be able to learn from previous mistakes, be able to promote successful programs and practices, and alert others about obstacles in the design, implementation, and evaluation of Tech Prep. A Tech Prep leader is someone who is a change agent, someone who is proactive, creative, flexible, and open to new ideas. The leader needs to be committed to long-term improvement and willing to take risks. (G. Harkin, personal communication, February 4, 1994)

> We talk about the idea of sticking with it. Perseverance. You're asking people to change the way they do things, and this takes a lot of getting used to. The Tech Prep leaders have to understand that you are asking people to

> change the way they've done business and that gets uncomfortable. (C. Laughlin, personal communication, February 3, 1994)

Myrtle Stogner, coordinator of the national Tech Prep demonstration site in Richmond County, North Carolina, has pioneered Tech Prep leadership development throughout North Carolina. She described the following qualities needed by a local coordinator:

> They have to be excited, enthusiastic. They have to have the know-how to generate the most powerful people in their community to get behind Tech Prep. They have to be able to do the nuts and bolts work behind the scenes. . . . [But] the truth is they can't make it happen by themselves. A very important part is the involvement of the principal and teachers, because they work directly with the students. There is the ability to find and work with the leaders, do the background work, and get them to take some responsibility for making it work. If people know and have respect for the coordinator, it will help. (M. Stogner, personal communication, December 22, 1993)

Many of the community or educational leaders to whom Stogner referred are associated with the organizations that form the foundation for any local Tech Prep effort such as secondary schools, postsecondary institutions, businesses, labor organizations, and community groups.

Defining the Three Essential Partnerships

To ensure the success of Tech Prep, three partnerships are seen as vital to the implementation of any initiative: vocational and secondary, secondary and postsecondary, and school and work. Throughout the nation, local consortia and state agencies frequently identify these relationships as the centerpiece of educational reform with Tech Prep. What are the goals of these partnerships? Why are they important? Several of the national Tech Prep leaders helped answer these questions.

The *vocational and academic partnership* is needed to facilitate the development of integrated and authentic core curriculum. Trudy Anderson, Vocational Director in Idaho, spoke of the importance of not confusing applied academics with Tech Prep, and ensuring integration of vocational and academic education in meaningful and rigorous ways:

> There's a great danger that in some places the applied subjects are being seen as what high schools do, and they are not integrating with vocational education in the high schools. If that is not done, I truly believe Tech Prep

> will fail. . . . If you don't have something to put [Tech Prep] into context with, like the occupational program, Tech Prep will fail. . . . Some people just want to deal in the applied subjects, and that's easy to do because it's easy to stick them in the curriculum. [But] that's not Tech Prep, and I don't think we can let it be sold as that. (T. Anderson, personal communication, January 27, 1994)

Why are curriculum integration approaches, in addition to applied academics, so important? How should they be carried out by teachers, primary participants in any Tech Prep system? Both Dale Parnell, author of the *Neglected Majority* (1985) and Jack Miller, coordinator of the national Tech Prep demonstration site in Gresham, Oregon, help to answer these questions by addressing the necessity for vocational and academic teachers to collaborate:

> We suffer in education from what I call isolationism. Teachers prepare lessons in isolation. [They] teach in isolation. The academic is separated from the vocational. Even vocational is separated from vocational. We certainly separate the high school from the postsecondary. And I think that one of the challenges for administrators at all levels is how do we consistently provide opportunity for people to come together. That's why I'm urging employers be present in our discussions. I call that "reality therapy." They bring a sense of reality to it. They're really the touchstones of reality in planning the curriculum. (D. Parnell, personal communication, January 24, 1994)

> In terms of implementation, change only occurs . . . when teaching changes. So if you want to change learning, you have to change teaching. . . . We've found that academic teachers tend not to talk to vocational-technical teachers. The vocational teachers tend to minimize the importance of general education. . . . [Yet] we know from [the] SCANS report, *America's Choice*, and *America 2000*, that students need both the highest skills and the greatest understanding of math and science. (J. Miller, personal communication, December 17, 1993)

The *secondary and postsecondary partnership* emerges from actions to formally align and articulate programs between secondary and postsecondary schools, two-year (e.g., 2+2) and sometimes four-year schools (e.g., 2+2+2). As described by Jack Lenz, Tech Prep Coordinator in Ohio, Tech Prep must span both the secondary and postsecondary levels: "It just happens to start in high school and end with the two-year associate degree or the two-year certificate. We look at the total program" (personal communication, February 3, 1994). As a result of the secondary/postsecondary

partnership, students should be able to move smoothly from one level of education to another without duplication of effort or lost time.

A recognition that most Tech Prep implementation activity has occurred within high schools was made by several national leaders. At the same time, they made strong recommendations for postsecondary institutions to create partnerships with secondary schools and take a more active, even proactive, role in Tech Prep. Dan Hull, co-author of the *Tech Prep Associate Degree: A Win/Win Experience* (1991), and Trudy Anderson, Vocational Director in Idaho, provided perspectives on the challenges being faced in linking the secondary and postsecondary levels, and also speculated about the apparent reason for resistance to Tech Prep at the postsecondary level:

> [I]t's important that community colleges understand this is not just bringing them more students, but it's bringing them . . . a different student. They need to understand what's going on in the contextual learning areas, that the students coming to them are not brain dead in math and science, but that they have had significant mathematics and have achieved it well, that they have got laboratory science courses, that they have a broad technology background in a cluster of their chosen field, and they're going to be ready for different types of courses.
>
> I emphasize the fact that the community college [needs to] provide advanced skills, that they have to sit down with secondary educators and business and design the curriculum first, and then sort out where it's taught. . . . The most important thing . . . [is to] bring the whole notion of contextual and applied learning up to the postsecondary level. Tech Prep is, first and foremost, reform in teaching and learning. I think it's going to be a bigger challenge to pull that off at the postsecondary level. (D. Hull, personal communication, February 1, 1994)

> [A] great deal of time [is] being spent getting secondary and postsecondary [teachers] acquainted and working together, making sure they've got business at the table when they're talking about curriculum development and change. . . . [W]e've got people from the . . . secondary [and] postsecondary [levels] working together. . . . [B]efore Tech Prep, a lot of those people didn't even know one another.
>
> I would share with you I think the greatest resistance . . . is that postsecondary faculty realize after a while that they have to change. . . . What they've discovered is in the technical component and the skills area, that very often the . . . high schools have many of the same courses that postsecondary institutions do. So to provide a skill-enhanced program, offering the full two-year degree, they have to "rigor-up" that postsecondary program. That's a surprise to them, and I would say that's where some of the greatest postsecondary resistance comes from. We're requiring they

> develop skill enhancement, [not] a time-shortened curriculum. (T. Anderson, personal communication, January 27, 1994)

Furthermore, Trudy Anderson, and Julia Vitale, former coordinator of the Tech Prep consortium in Houston and now at Center for Occupational Research and Development (CORD), spoke of progress made on statewide efforts to articulate curriculum from the secondary to the postsecondary levels:

> The technical colleges [in Idaho] have made an agreement . . . [that] they will honor what any one of their sister institutions have agreed to. We feel [this agreement] gives a great deal of mobility [to] the student. To make this agreement work, we have formed a Tech Prep postsecondary review committee. Every Tech Prep program in the state . . . is cleared . . . through that committee. Our Tech Prep [state] coordinator chairs the committee. It is made up of program administrators from each of technical colleges. They're learning a lot. . . . But also, they have to, at that point, say our institution would be unwilling to accept this kind of arrangement. If that's the case, you know that you've got to do some modification. (T. Anderson, personal communication, January 27, 1994)

> I think we are seeing some things changing at the state level to get community colleges more in partnership with each other. Some states like Kentucky, Texas, and others are forming consortia of community colleges [and] going to common course number systems. The states are providing some leadership in trying to get the community colleges to adapt to Tech Prep students that are coming out of the high schools. So, from that point of view, I can see where changes are taking place. . . . They're trying to eliminate the hassle of making agreements with high schools at one point and then having to go back five years later and change it in order to be consistent with other community colleges. (J. Vitale, personal communication, February 1, 1994)

The *school and work partnership* is reinforced by the federal STWO legislation to ensure a strong partnership between educational entities and employers. Better communication between these groups can result in more work-based learning and the establishment of recognized performance standards and occupational credentials for students and graduates. Laurel Adler, coordinator of a national Tech Prep demonstration site in Los Angeles, described her consortium's experience with establishing formal partnerships with businesses:

> It is key to get business and industry involved early in the process. Don't wait until you're ready for the work-based learning component. It's too late. By including them early, an understanding of the student's

> development and emotional investments exist on both sides. It makes for a much smoother transition.
>
> Business and industry partnerships can be started through one-on-one relationships between teachers and business representatives. Our teachers are given at least one hour of daily prep time plus one hour for lunch to make business and industry contacts. We work with anywhere from 350 to 400 businesses on a daily basis through job shadowing, speakers coming to our seventh and eighth grade classes, mentorship programs, and the actual workplace learning instruction that teachers and employers negotiate. It is part of each teacher's job to make contacts in the community. Businesses have also provided free classrooms. Our business speakers at the middle school levels are the best representatives to the parents.
>
> Formal agreements with business are important as they symbolize the level of commitment on both sides. It also helps from a legal standpoint. It is crucial that we know who is responsible for ensuring the students at any given point in time. About eight years ago, there was a question regarding student learning in business; it was looked upon as slave labor. It wasn't, but since then we are careful to ensure that company's do not use students to replace employees.
>
> It is also important for people to remember to be patient. Start working with those who are enthusiastic first, get business and industry involved early [and] in as many ways as possible. (L. Adler, personal communication, December 15, 1993)

Involving Key Stakeholders

Stakeholders are the individuals, groups, and organizations likely to be impacted by Tech Prep and interested in ensuring its success. Inviting representatives of all the groups that have a keen interest in Tech Prep provides several benefits. First, the viewpoints of these groups can provide an enriched understanding of what education should be about and how it should be delivered. Even though they are sometimes at odds, stakeholders can provide the food for debate that is absolutely crucial for reconceptualizing and restructuring education. Second, when a working consensus can be reached and a broad-based coalition formed, the opportunity for creating effective Tech Prep programs is also enhanced. Third, participation by stakeholders in these types of situations can create shared ownership for Tech Prep and better prepare people for change, an inevitable consequence of any serious reform effort (Key, 1991).

How should individual representatives of stakeholder groups be selected to participate in the planning and implementation processes for Tech Prep? Certainly invitations should be extended to individuals known to be leaders and innovators by

school, college, business, and community leaders. People who have a track record of creativity, problem solving, commitment to change, and can instill those qualities in others are important to invite. It is also crucial to ensure that representatives with diverse cultural backgrounds, economic circumstances, and other diverse characteristics and perspectives be a part of the initiative. Sometimes these individuals volunteer to be a part of Tech Prep implementation; other times they need to be sought out and given encouragement to express their opinions. By creating this sort of collaborative environment, the community-at-large is ensured a voice in a democratic process that can result in rebuilding education through Tech Prep.

Reflecting on some of the challenges her consortium has faced in early efforts to implement Tech Prep, Carla High, coordinator of the national Tech Prep demonstration site in Oklahoma City, spoke of the importance of allowing time for the various stakeholder groups to develop ownership:

> We were in a hurry to implement. We developed a plan and implemented it rather than taking time for all of the audience to develop ownership, such as the teachers and the curriculum [and] counselors and career plans. It was all put together by a committee and pretty much implemented. But were I to do it over I would have taken a lot more time to have each of these audiences develop a plan and develop ownership, and move through that progression. (C. High, personal communication, December 15, 1993)

Dick Miguel, Vocational Director in Illinois, provided his perspective on how crucial it is for both local and state agencies to get stakeholders involved and committed to any school-to-work initiative:

> Get out there and let everybody know what's going on. Outside vocational education, very few people know what's going on. We have tried to change that in Illinois. All our growth areas, like Tech Prep, apprenticeship, career guidance, school-to-work, and partnership academies are funded with new money from the state. The state board, the governor, and the state legislature have been very supportive. I think that's because we have kept them informed and have tried to meet their goals as well.
>
> Don't do things on your own. These initiatives are very important to other people, but they've got to feel that they are involved. If you don't get them involved, you won't go anywhere. I had a revelation a couple of years ago when I was with a business group. Someone in the group said to me, 'well, you may be doing a good job, but we're not involved. How could we possibly know what's going on? It's extremely important to get the private-sector involved in ways that make them all feel they have ownership. (D. Miguel, personal communication, February 10, 1994)

Beyond the partners discussed previously (e.g., vocational and academic faculty, secondary and postsecondary personnel, educators, and employers), what other stakeholder groups can facilitate the implementation of Tech Prep systems? Although that question is impossible to answer for all local consortia, the following are some of the groups that consortia should consider involving:

- Counselors
- Students and parents
- Four-year colleges and universities
- Educational board members and college trustees
- Teacher educators
- State agency staff
- Community-based organization representatives
- Members of the public at large

All of these groups play an important role in implementing Tech Prep systems.[2] However, three of these groups were repeatedly identified by the Tech Prep leaders that we interviewed as crucial, yet often missing from planning and implementation processes. Presented below are the ideas of several Tech Prep leaders regarding the following groups: counselors, students and parents, and four-year colleges and universities.

Counselors—Three national Tech Prep demonstration site coordinators, Myrtle Stogner, Mary Byrski, and Judy Mamaras, described several approaches to involving counselors in their Tech Prep initiatives:

> [W]e had a counseling team. It was K-14. The [counselors] were to do a matrix of what was in place at every level that dealt with identifying [student] interests, strengths, aptitudes, and providing career information. The [team] found they all had parts of each, but there was a need for a more consistent thread throughout the county, and across grade levels. Then we asked them to come up with a minimal matrix of what should happen first in kindergarten, first grade, second grade . . . all the way through.
>
> What they discovered was that a lot of people had some interest inventories, but they weren't consistently being used. We then established [standards for counseling] at each grade level. This meant the work and planning for the new career education system was shared. The system created for registration of students, annual updates, [and] additional testing. . . .

[2] For a more in-depth discussion of the roles and responsibilities of key stakeholder groups, see Bragg, 1991, pp. 21-23.

We've got some people that are so committed to the concept and have really worked hard.

We've provided them with a lot of opportunity to get into business communities, to get into the workplace to see how it's changed. We've encouraged them to attend professional activities that would broaden their vision. We had six teams that we called School Business Industry Collaborative Teams, and they spent four days in the business/industry. . . . [T]hese were integration teams . . . and the guidance counselors were part of that. (M. Stogner, personal communication, December 22, 1994)

[Counselors have] been very involved in developing our course sequences, the career areas, staff development, and team participation. We sent teams of people, such as an academic teacher, vocational teacher, and counselor to different events and it helps them to know each other better, which is needed because we don't have much joint planning time.

Counselors have been very involved in the staff development. We did a big workshop this summer on learning styles, and again, the counselors are very involved in that, in trying to help the teachers understand the different ways in which students learn. I would say two or three of our schools now are implementing a process where students have their learning styles assessed in the ninth grade where they make that information available to teachers. (M. Byrski, personal communication, December 21, 1993)

Every year I hold an orientation here at the college for guidance counselors around the state. We invite them up to tour the facility, to sit in on some of our classes, to talk with our faculty about the programs here, but then also about job opportunities. We have high school teachers come and talk with them about what's happening in their classrooms with applied academics. . . . This helps counselors when they're beginning to encourage students to think about Tech Prep.

The program guide is something else that we developed for guidance counselors so that they would have very clear information on the goals of the program, the target population, the course of study, and also the programs of study at the community college, [including] where it leads. The program guide is updated every year, and it's mailed to every guidance department the first week of school. We have a newsletter and that provides not only for counselors, but other audiences in the state with current information about Tech Prep. It keeps the [Tech Prep] program visible, and that's important. You have to constantly be visible and keep the program alive. I will do presentations, school by school, and I will meet with guidance departments on a request basis.

[State coordinators] need to know that the role of guidance is a pivotal role in the Tech Prep program. The guidance counselors not only have to be informed about the program but they also need support when they're putting

> students into the program because, again, they're under pressure from their administrators, and from parents. Often times, high schools will boast about "87% of our students go on to four-year colleges." Any support that guidance counselors can have when they're trying to promote and develop a good strong Tech Prep [program] is very helpful.
>
> I'd like to mention one other piece that we've added this year that I'm very excited [about]. . . . We're developing and scheduling a series of tours in business and industry for teachers and guidance counselors. . . . It gives them first-hand information, [such as] talking with personnel directors. I think it's going to be enlightening. We're hoping that from these tours [teachers and guidance counselors] will then be able to do a full-day inservice in these different areas. (J. Mamaras, personal communication, December 21, 1993)

All three leaders indicated that counselors need to be thoroughly informed about Tech Prep. Some of the ways to accomplish that goal range from offering presentations to all of the schools in a local consortium to developing a program guide that identifies course sequences to providing professional activities such as tours in local work sites. What contributions can counselors make to a Tech Prep initiative? Counselors can help students identify their career interests, aptitudes, and learning styles. Their work with curriculum teams can help to define career cluster areas and provide career education and counseling across grade levels and schools. To set guidance and counseling standards across grade levels, counselors from throughout a consortium need to plan together. They also need to be a regular part of joint planning activities with students, teachers, administrators, employers, and others.

Students and Parents—Judy Mamaras and Carla High, both national Tech Prep demonstration site coordinators, provided some advice in ways to reach students and parents with information about Tech Prep:

> We . . . try to create more opportunities for students at younger levels . . . through job shadowing, guest speakers who talk about occupations, skills needed, and the future of these occupations. . . . What we've found is that not only are the students receptive but that [it] is the best way to communicate with parents. Many times the things that business and industry has to say are the same things that we say, but we don't have the credibility or the carrot to dangle. We have used our business and industry representatives to communicate with our audiences very effectively. (C. High, personal communication, December 15, 1993)

> I think the parental involvement is so important. Coming out of the '40s and '50s, [parents] equated four-year colleges with their children's success. Parents can put pressure on guidance counselors and high school personnel to keep their children in a four-year college prep program, whether that be the right decision or not. . . . Involving parents does a couple of things for us. Number one, it gets information to them about the emerging job market in the '90s and beyond that is not going to require four-year college degree people. We can explain the kinds of jobs that will require two-year degree people, the value of these jobs for the economy, the kinds of pay, and the career ladder. [Parents] begin to see that the job market is different [than their experience] in [the] '50s and '60s and, therefore, the preparation is different.
>
> The second thing is to get [parents'] support. They can see that this is a very viable option that means more success for their child. Often times, you can have a student in a four-year college prep program, maybe entering the four-year school and dropping out. [Tech Prep] gives them a second step, so they can go to the two-year college, always with the goal that they could transfer to a four-year school. . . . We focus on getting parents informed. If they see that their child is taking technical Math instead of an Algebra, they're not panicking. . . . It helps with the whole recruitment process. Parents find this a very welcome option for students. [As a parent] if you have a child that isn't performing well in that typical four-year college prep program, to have another college choice is very welcome. So we found if we can get information to them and get them involved, we have a lot more success. (J. Mamaras, personal communication, December 21, 1993)

According to Carla High and Judy Mamaras, involving parents and students is an important step to creating a Tech Prep system. By linking with local employers, many of the questions of parents and students can be addressed, sometimes even more effectively than when the programs are described by educators. Having their input can also help in designing curriculum that is responsive to parent and student needs and concerns.

Four-Year Colleges and Universities—A national sample of local Tech Prep coordinators suggests that of all the stakeholder groups, four-year colleges and universities are seen as the least supportive of Tech Prep (Bragg et al., 1994). Difficulties with four-year colleges and universities accepting applied academics courses for college admission have been widely reported (Andrew & Grubb, 1992; Bragg et al., 1994; Dornsife, 1992a). The use of applied academics courses appears to create skepticism among four-year higher education institutions about the legitimacy of Tech Prep as a rigorous educational reform. However, according to Dale Parnell, in his home state of Oregon, some of these misgivings have been overcome, offering a step forward potentially for modeling change for other states:

> One of the problems was the recognition of the applied academics courses. . . . We brought together faculty members from high schools, community colleges, and universities in our state to examine [applied academics] courses and talk with teachers who have taught them. After reviewing, [the faculty] did recommend that they be accepted as preparation for entry into the university. (D. Parnell, personal communication, January 24, 1994)

In Idaho, the four-year higher education institutions have joined together to support Tech Prep curriculum by creating statewide access to applied baccalaureate programs. According to Trudy Anderson, this is how it is being done:

> All of our four-year higher education institutions have now created applied baccalaureate degrees. We have an agreement that any associate of applied science will articulate on face value to any one of those baccalaureate programs. That being the case, we have to assure colleges that Tech Prep is not a time-shortened program where a good deal of the coursework was earned while the student was in high school but actually involved two years of rigorous college-level work. So some of our effort is also to protect that continua, if you will, that we have developed in the state, and also we believe very much that the whole impetus behind Tech Prep was the belief that we would prepare an individual with a higher level of skills. It was intended to be a skill-enhanced kind of curriculum, and not be sold just as an early out. I would tell you we do allow some of that articulation. . . . Students in our high school program who are involved, [who are] actively engaged in a full Tech Prep curriculum, will probably carry with them somewhere between six and twelve college credits once they enter the higher education institution. (T. Anderson, personal communication, January 27, 1994)

These testimonials indicate that it has been possible to break through barriers created by four-year colleges and universities in two states to create Tech Prep systems based on alternative curriculum such as applied academics or integrated vocational and academic education. Evident in both of these situations is the active involvement of higher education representatives in the curriculum reform activities.

Creating the Local Consortium

The idea of using a consortium-type approach when implementing Tech Prep is meant to enhance the potential for success. A consortium can link institutions, personnel, programs, stakeholders, and support services in new and innovative ways. Huberman (in Fullan, 1992) advocates cross-organizational models (similar to the local consortium arrangement mandated by the Tech Prep Education Act) comprised of teams and networks as a way of implementing educational innovations. By taking this approach, schools,

colleges, businesses, and other individual members of a consortium can vary their practices depending upon their own needs. However, the approach can also facilitate cross-fertilization among various organizations when teams bring together people from these various sites to address critical issues and problems. All in all, the local consortium arrangement seems to offer potential for creating an environment conducive to creative thought and experimentation, and for progressing carefully through the implementation process.

The Tech Prep Education Act of Perkins II mandates that Tech Prep be administered at the local level through a consortium of secondary and postsecondary institutions. Most local consortia involve a community college and its surrounding secondary schools. Usually a local educator at the two-year college level is appointed as the coordinator (or director) of consortium activities. Often the two-year college acts as the fiscal agent for the federal grant. Decisions about organization, administration, and governance of a local Tech Prep consortium are often carried out by the local coordinator, along with an executive committee. In some cases, other groups such as steering committees and advisory councils are used (Bragg et al., 1994).

Huberman (in Fullan, 1992) pointed out that consortium-type arrangements can be instrumental in stimulating more effective practices because of the opportunity to bring together people who are searching for new and better ways to educate students. To carry out these important goals, local consortia have many responsibilities. Gisela Harkin of the U.S. Department of Education points out several of them:

> The consortium must have a clear purpose and focus, specific goals and objectives, [and] a well-trained staff. . . . Leadership in Tech Prep must be able to generate and maintain external support for Tech Prep through various strategies, and I would just mention a few:
> - Promote and obtain supportive state legislation to change educational practices in the state;
> - Establish and maintain meaningful partners involving stakeholders and all players from the outset; [and]
> - Carry out strong marketing efforts.
>
> In other words, there are a series of strategies by which Tech Prep leaders could generate and maintain external support for Tech Prep. (G. Harkin, personal communication, February 4, 1994)

In order for the kinds of strategies described by Harkin to be carried out, local consortia need to be organized effectively. Within a local consortium, people can be

organized in a number of different ways to carry out implementation. Three organizational arrangements have been identified for local Tech Prep consortia (Bragg, 1991). First, the functional approach involves consortium-wide committees organized around such areas as curriculum, marketing, implementation, or evaluation. This approach was advocated by Hull and Parnell (1991) and according to Bragg et al. (1994) is apparent in many of the local consortia operating around the nation.

A second type of approach, a site-based approach, involves committees or teams of faculty, counselors, and administrators representing each of the sites affiliated with a consortium along with employers. Each site-based team concentrates on matters of concern to its own school and then represents its constituents in the decisions of the consortium as a whole. Two-thirds of the Tech Prep consortia in the nation appear to be using this site-based approach in some or all of the schools and colleges involved in implementation activities (Bragg et al., 1994).

Finally, although not often used, a third organizational arrangement can be employed for Tech Prep. It emphasizes a combination of the site-based and functional approaches within each of the organizations in a consortium (e.g., schools, colleges, businesses) and across the entire consortium as well (Bragg et al., 1994). This structure replicates the organizational patterns often used to deploy total quality management (TQM) initiatives in public- and private-sector organizations (Kirby & Bragg, 1992). Whereas this organizational arrangement is more complex, it has the advantage of creating communication networks that can encourage and support various cross-functional implementation activities. People are encouraged to organize into teams that focus on specific projects, problems, and issues (e.g., development of integrated curriculum, marketing to students and parents, overcoming problems with skeptical board members) within the schools, businesses, or other organizations involved. People are pulled together from across the consortium to focus on key components (e.g., professional development, articulation agreements, program evaluation) to ensure successful implementation. Together, these grassroots teams, often along with a project management team and executive-level team that commit resources to the effort, can provide the organizational structure for implementing Tech Prep systems.

Organizing Teams

No matter the organizational arrangement used by a local consortium, teams can play an important role in Tech Prep. Key (1991) recommended broad-based stakeholder involvement of local and consortium-wide planning teams, all supported by a full-time consortium director using a transformational empowerment model. Of course, recruiting individual representatives of the various stakeholder groups and organizing them into teams does not ensure teamwork will occur. Effective teams evolve over time and through the conscientious efforts of committed people. Through the sharing of individual expertise, the entire team grows, and the consortium benefits. Teams can break down barriers between people, programs, and organizations, facilitating an environment where reform of the entire system becomes a possibility. However, many teams fail and, when they do, they can drain people's time, talents, and enthusiasm. That is why it is essential that teams are organized and used effectively (see Kirby & Layton, 1992).

Assumptions should not be made about people's awareness of team concepts simply because they have experience working on committees. According to Berg (1991), there are five basic elements needed to build and maintain productive teamwork: (1) build commitment, (2) develop trust, (3) encourage open communication, (4) manage conflict constructively, and (5) establish ongoing assessment of the team process. To develop commitment, team members must feel a sense of ownership in new Tech Prep systems. The personal involvement and support of each member of the team is essential to such a complex and lengthy undertaking. This requires that team members be enthusiastic promoters of the initiative, that they model a personal commitment, and that their behaviors support the team. In addition, the institutional environment must support and reward individuals for contributing to teamwork by providing them with time and materials they need to do their jobs well.

Members of teams should have an understanding of the context in which they operate to function as effectively as possible. As with individuals, groups do not lead an isolated existence. The context in which the team operates includes its history, its future expectations, its structure and purpose, and its relationship with other groups (Worchel, Wood, & Simpson, 1992). For teams that are implementing Tech Prep, a knowledge of past efforts is important. Differences from state to state and from consortium to consortium are to be expected. In some areas of the country, there is a long history of 2+2 articulation, use of integrated curricular materials, or other Tech Prep involvement. In these areas, Tech

Prep is likely to look quite different than in places where the concept is entirely new. These differences need to be well understood so that teams can set realistic goals and expectations for themselves.

Effective leadership within each team is necessary. Team leaders should be comfortable with their role, whether they have been appointed or volunteered, and also in circumstances where the position is shared. All team members should engage in the process of building and maintaining productive teams. To achieve this goal, team size should be considered carefully. Due to the range of purposes and situations associated with Tech Prep, group size should be flexible. Active teams should remain small enough so that the work can be accomplished efficiently. Advisory groups may be somewhat larger to encompass a broad range of perspectives. Regardless, it is important to remember that each member of any team should have a critical role to play and they should be encouraged to contribute enthusiastically. Of course, as new members join any team, training should be provided in such areas as the goals and status of the team, ground rules, and group processes.

An understanding of the different types of teams, such as the site-based or functional teams discussed previously, combined with an appreciation of the importance of teamwork, will help team members accomplish their goals. Once they are organized and charged with a particular activity, teams can become extremely active, often functioning on a weekly or sometimes daily basis when a crucial factor such as joint planning time is made available. Through this kind of commitment, an environment conducive to implementation can be created. In addition, by modeling positive teamwork behaviors, faculty can help students gain the teamwork skills highly recommended by groups such as the Secretary's Commission on Achieving Necessary Skills (SCANS) (1991).

Empowering the Crew

Empowerment "is an act of building, developing, and increasing power through cooperation, sharing, and working together" (Vogt & Murrell, 1990). It does not occur through a simple transaction between leader and follower; rather, it is an interactive, transformational process. Empowerment strengthens people, enables leaders to act, and builds credit that can be drawn upon when extraordinary efforts are required (Kouzes & Posner, 1987). Empowerment of people throughout a consortium is crucial if Tech Prep is to succeed. It can occur when a collaborative work culture is established that involves

people in the operations and management of schools, colleges, businesses, and other organizations in a local consortium.

Fullan (1992) argues that changing the culture of schools, specifically implementing collaborative work cultures, is very difficult. He suggests this aspect of school culture is particularly dependent on teachers' abilities to change. Hargreaves (1992) supplies a scheme for understanding teaching cultures that can be broadly applied to educational organizations. He advocates paying attention to the forms of these cultures rather than the content. He distinguishes among four types of teaching cultures based on form: individualistic, balkanized, collaborative, and contrived collegial. In the individualistic culture, teachers are almost completely isolated, both from other academic departments and from other teachers in the same subject area. In the balkanized culture, teachers are members of small groups, subcultures within the organization, in which little communication with the outside world takes place. True collaborative cultures in which teachers share information, evaluate each other objectively and honestly, work and learn together, and provide collegial support are rare. Instead, reform imposed from the top down and from outside the organizational culture almost inevitably results in a culture of contrived collegiality.

In the case of Tech Prep, a persuasive argument can be made that it represents the fourth approach, a sort of contrived collegiality. This is because, at least to some extent, teachers are *required* by the federal legislation to collaborate. Such an imposition of reform and resulting culture of contrived collegiality can have positive and negative effects, according to Hargreaves (1992). On the positive side, it can be a first step in the direction of a collaborative culture that might not otherwise have been taken. To be sure, individuals involved in this *required* activity are sure to hold diverse viewpoints, making groupthink a highly unlikely possibility. On the negative side, contrived collegiality "cannot legislate a collaborative culture into existence, nor provide an adequate 'instant' substitute for such a culture" (p. 231). It may also "affront the dignity of teachers by failing to recognize what is already going on collegially" (p. 231) (i.e., requiring teachers to participate in meetings that prevent them from being involved in other activities they have come to value). Care must be taken to see that this negative side does not develop, and even then the ultimate effectiveness of such contrived circumstances is difficult to predict. Yet, one approach is to engage teachers in meaningful professional development efforts to accomplish this goal.

Professional Development—Huberman and Miles (1984), Little (1993), and others have written persuasively of the importance of having hands-on, concrete experiences with innovations as a way to create ownership for them and encourage their institutionalization. They discussed the importance of creating a safe environment for experimentation as a way of ensuring full implementation. Peers, coaches, and facilitators can help to create this environment. Development of a culture of trust is vitally important. A supportive atmosphere can be nurtured throughout an organization by emphasizing mutual understanding, tolerance, and acceptance of individual differences and risk-taking (Berg, 1991).

In order for school, college, business, and community leaders to take an active role in implementation of Tech Prep, they need to be educated about all aspects of it. Without a thorough understanding, leaders cannot be expected to understand how it can impact their institutions. Certainly, they cannot be expected to be actively involved in the effort. This education can occur through professional development activities at the local, state, and national levels. Listed below are some topics of professional development occurring in local Tech Prep consortia nationwide (Bragg et al., 1994):

- academic and vocational integration
- alternative assessment
- applied academics
- articulation
- business/industry partnerships with education
- career education
- cooperative learning
- critical thinking
- curriculum development
- guidance and counseling
- leadership
- learning styles
- national skills standards
- outcomes and outcomes-based education
- SCANS (Secretary's Commission on Achieving Necessary Skills) competencies
- special needs education
- strategic planning
- teaching methodologies
- team building
- Tech Prep awareness
- total quality management (TQM)
- workforce development
- youth apprenticeships (p. 35)

These topical areas have been addressed through formats that range from national conferences to local efforts involving multiple avenues (Bragg et al., 1994). In 1992-1993, prominent among the professional development activities being carried out by local consortia were the following: summer curriculum development institutes, awareness meetings for large groups of local school personnel, one- or two-day conferences involving external speakers and local business and industry representatives, weekly or monthly team meetings, and tours and exchanges of educators with business/industry and labor. Listed below are five different ways multiple strategies of professional development were reported to be conducted by local consortia:

1. Information/awareness sessions were conducted with each of the organizations in a consortium focusing on team building, leadership development, planning, and curriculum development. Additional training occurred throughout the year for the teams, culminating in a two-week summer institute focusing on curriculum development.

2. Personnel employed by local industries, school systems, and a community college joined together to form a sharing group with three goals: (1) to develop partnerships; (2) to facilitate involvement of school personnel and students in TQM; and (3) to enlighten local educators and students about local industry needs. Training sessions involved teachers in local industries.

3. A four-part inservice strategy was used for teachers and counselors in a consortium. The four components involved (1) career guidance activities in the classroom, (2) business and industry tours, (3) computer-assisted career guidance, and (4) multicultural awareness and inclusion.

4. Structured visits were conducted with local business and industry for teachers to interact with workers at all levels. As a result of these visits, teachers considered the implications for curriculum and developed curriculum and instruction across the disciplines.

5. A regional state university involved interdisciplinary teams of secondary and postsecondary educators in a graduate-level course on Tech Prep. The teams participated in classroom instruction as well as business/industry tours. As a result of participating in this course, participants received credit and a stipend while

producing new articulation agreements and integrated vocational and academic curriculum.

Communications—Effective communication is another requirement for creating a collaborative and empowering environment conducive to Tech Prep implementation. Members of a team must value honest, direct, and open communication so that ideas flow freely and important information is shared. Such an understanding can only be achieved through effective communication, which entails active listening to others and the free expression of ideas. Open communication allows the expression of disagreement which, in turn, can lead to better understanding of diverse perspectives. An important aspect of communication is the structure of the consortium itself so that all voices with a stake in the outcome are heard. (For more discussion on consortia, see the previous discussion in this section on local consortium arrangements.)

Managing conflict constructively is also absolutely essential. Although sometimes difficult to understand and accept, relationships among team members can actually be enhanced by well-managed disagreement (Berg, 1991). Establishing communication networks within the Tech Prep arena is necessary to ensure that progress is noted, duplication of effort is eliminated, and miscommunication is avoided. Communication mechanisms such as meetings, minutes, newsletters, conference calls, and e-mail can link participants on a consistent basis.

Joint Planning Time—Leaders must recognize and provide for the increased time needed to accomplish team communication efforts. Finding time to meet and plan any educational endeavor is difficult in most high schools and postsecondary colleges. In fact, local Tech Prep coordinators reported problems with getting joint planning time to be the top barrier of fifty barriers to local implementation (Bragg et al., 1994). Faculty have little uncommitted time and, even when they do, rarely do their brief planning times coincide. When implementing Tech Prep throughout a consortium of multiple school and college districts, it will take time to reach consensus about purpose, goals, target populations, and curriculum. Therefore, it is very important for Tech Prep grant funds to be used for release time or the hiring of substitute teachers so that staff can be actively involved in planning on a regular basis. Jack Miller and Mary Byrski, both coordinators of national Tech Prep demonstration sites, spoke with us about the need for faculty to be provided with the time to carry out planning:

> The success of Tech Prep is directly related to the recognition that teachers are very busy people. You can't expect major change and curricular change on the back of everything else they do. You've got to free them. Recognize that they're busy. It doesn't take a lot of money; what it takes is . . . giving them support by reimbursing the local school district for substitute coverage to free the teacher to come to a meeting. (J. Miller, personal communications, December 17, 1993)

> They're going to spend a lot of time as a team, developing a curriculum that they have to implement as teams, and the principals who sent the teams have to be committed to allowing those teachers who are working out their schedules so that they can have some common planning time.
>
> [T]hat, obviously, is the biggest issue. . . . We sent some teachers to a conference last year, and they came back just really revved up . . . and they started talking, and all of a sudden they realized they were doing the same thing. . . . [T]hey got a science and math teacher involved . . . and they said let's develop a curriculum around some of the stuff we're all teaching commonly. And so they got together over the summer and literally wrote some curriculum, but for the most part just coordinated what they were teaching. . . . [Now] they jointly come in and try to teach if they can, but a lot of times the team teaching doesn't work because they don't have common class time. (M. Byrski, personal communication, December 21, 1993)

The problem of finding common planning time for busy people, especially faculty whose days are scheduled for them, is enormous. Finding sufficient time to meet and plan is a universal problem for Tech Prep consortia. In fact, in our recent study of the barriers to local Tech Prep implementation, a national sample of Tech Prep coordinators ranked the problem of joint planning time as number one among fifty barriers. What can local consortia do to resolve this problem? In an article entitled *Finding Time for Collaboration*, Raywid (1993) suggests many different strategies that can be helpful in getting time for teachers to meet and plan such as the following:

- Be sure people on the same team have the same lunch period preceded or followed by a common planning period, yielding as much as 90 minutes for sharing.
- Block out a morning or afternoon for teachers to meet while students are engaged in community service, work-based learning, or their own team meetings.
- In larger schools, increase class sizes by one or two and use surplus funds to finance substitutes while regular teachers meet.
- Adopt a year-round schedule with three-week intercessions between quarters allowing teachers time for two- or three-day meetings held periodically.

- Take the days set aside for daylong staff development, divide them into two-hour time blocks, and distribute that time throughout the school year to create two-hour planning periods every two or three weeks.
- Lobby the state to convert instructional days to planning and/or professional development time.
- Lengthen the school day by 20-30 minutes four days a week; and dismiss school at noon on the fifth day, allowing teachers to use the remaining afternoon for planning.

This list represents a sample of the ideas shared by Raywid (1993) about finding time for teachers to collaborate. No matter how it is achieved, joint planning time is crucial to enabling teams to engage in the work of the consortium, an important part of which is creating a shared vision and goal setting.

Drafting the Plans

A shared vision, mission statement, goals, and policies are all important to creating a foundation for Tech Prep. Strong local leadership, open communication, and the establishment of achievable goals are essential to a successful planning process. Planning undertaken by a local consortium should reflect the unique character of the local communities, organizations, and stakeholders involved. Leaders must think seriously about Tech Prep and how it can ultimately contribute to improved educational opportunities for all students:

> [B]efore they jump off and try to get something done, leaders need to sit and ponder, and talk together with others about how to develop a very clear vision. (D. Parnell, personal communication, January 24, 1994)

Creating a Shared Vision

A vision has two critical facets to be meaningful and effective for those involved. First, the vision must be "an ideal and unique image of the future" (Kouzes & Posner, 1987, p. 85). It must present a picture of what the Tech Prep initiative will look, feel, and be like when it reaches the ideal. Second, a vision must be shared. Participants in Tech Prep should understand the picture and be individually committed to it. This commitment goes beyond buy-in. It implies both a decision to embrace the vision, and a sense of responsibility for making the vision a reality.

By making beliefs explicit, local leaders are better positioned to provide direction to the efforts of their consortia. Leaders who recognize the importance of a collective visioning effort display an important aspect of transformational leadership. They demonstrate that they are willing to step out, take risks, and break new ground:

> There is no freeway to the future. No paved highway from here to tomorrow. There is only wilderness. Only uncertain terrain. There are no road maps. No signposts. So pioneering leaders rely upon a compass and a dream. (Kouzes & Posner, 1987, p. 79)

A vision that is both descriptive and shared wields a great deal of power. It sparks excitement and generates enthusiasm for the future. It serves as a motivating force as people become excited about a vision they truly want to achieve. Focus and energy can be traced to a shared vision. It is this shared vision that "permeates the organization and gives coherence to diverse activities" (Senge, 1990, p. 206).

Tech Prep is a complex undertaking, with many levels and aspects of education involved. Pull one activity out, involve individuals in only that event, and the whole of Tech Prep is lost for those people. However, engage them with a shared vision and they can make Tech Prep their own. The responsibility for the whole also becomes theirs. A shared vision becomes a cohesive force to move the initiative forward, and a common identity for all those involved: "[A] shared vision also provides a rudder to keep the learning process on course when stresses develop" (Senge, 1990, p. 209).

Where To Start—Before engaging the consortium in something as arduous as developing a shared vision, it is important to make evident the assumptions made by individuals. Members of a local consortium are sure to hold different mental models of what Tech Prep should be. To disclose these mental models, it is important for members to develop face-to-face learning skills (Senge, 1990). This step takes time and willingness among participants to disclose their beliefs; however, people who become aware of their mental models (i.e., underlying beliefs and assumptions) and communicate them to others seem to be more capable of accomplishing their goals.

Argyss and Schon (1978) state that learning skills fall into two broad categories: (1) reflection and (2) inquiry. Leaps of abstraction, the ability to make broad generalizations on limited amounts of information, are unsafe in any organization but especially in new ones like a local consortium. Whenever possible, generalizations should

be tested directly. Creating awareness that generalizations exist in everyone's mind is the first step.

One way to confront generalizations is to simply ask, on what data is that generalization based? An exercise that helps to identify mental models is called the left-hand column exercise (Senge, 1990). It is a simple exercise to illustrate that everyone has mental models. Do this exercise anytime you carry on a conversation. To do the exercise, take a sheet of paper and draw a line down the middle. Then, while conversing, in the left column jot down your thoughts; in the right column, note the actual dialogue. Later, when the conversation ends and you can analyze your notes, you'll see your hidden assumptions as they paralleled your actual dialogue. You may see how your assumptions influenced your actual communication; you may also begin to improve your learning skills.

To ensure that group communication is productive, and that people are sharing their ideas and generalizations (leaps of abstraction), leaders should *practice* their communication and facilitation skills. How many meetings have you attended where nobody asked any questions? Or, where one person or one idea dominated. Both situations are uncomfortable and unproductive. To create a more positive environment, questions and ideas need to be balanced. Senge (1990) makes the following suggestions about communicating so that people's true beliefs are revealed and a shared vision can be developed:

To advocate your point of view . . .

- make your reasoning explicit and state the data on which it is based
- encourage others to explore your views and ask what gaps or strengths they see in your reasoning; ask them to provide different data or conclusions
- ask for others' views that differ from your own; ask others to question you on your views and on how you arrived at them

To inquire into other's views . . .

- state your assumptions clearly and acknowledge they are assumptions
- describe the data that your assumptions are based on
- don't ask questions unless you are truly interested in the response

When there is hesitation following an expression of opinions . . .

- ask what is it about the situation or those involved that is making open exchange difficult
- if there is mutual desire, design with others ways of overcoming these barriers

Few people would argue that reaching consensus on a shared vision is a simple or quick process. A shared vision is very difficult to develop and explain. The specific wording of the statement should convey the importance of the vision. It should incorporate vivid language that is positive in tone and easily understood. Kouzes and Posner (1990) identified four attributes of a vision statement:

1. It evokes images and pictures.
2. It focuses on the future.
3. It presents a standard of excellence, a possible ideal.
4. It exhibits uniqueness.

Developing a vision that has these four attributes is the initial step; developing the commitment is the next and never-ending step. Senge (1990) identified several guidelines to facilitate commitment:

- Be personally committed to the vision
- Be "on the level," without overstating or understating the meaning and impact of the vision
- Allow time and a safe environment for individuals to develop their own sense of vision

A Leader's Vision of Tech Prep—No one individual has provided more direction—more vision—for Tech Prep than Dale Parnell, the father of the Tech Prep Associate Degree (TPAD) model. His enthusiasm for the concept was evident in *The Neglected Majority* (1985) where he painted a dramatic picture of the need for a better form of education for the majority of high school students. Parnell's commitment to an alternative curriculum for general education students was evident in the following statement:

> New and different curricular models must be designed to slow the slippage, to bring more structure and substance to the curricular program, and to make college-program and degree completion more likely for more students. (p. 116)

Later in his book, Parnell defined the components of the TPAD program, creating a picture of an ideal TPAD program:

> The four-year 2+2 tech-prep/associate-degree program is intended to run parallel with and not replace the current college-prep/baccalaureate-degree program. It will combine a common core of learning and technical education and will rest upon a foundation of basic proficiency development in math, science, communications, and technology—all in an applied setting, but with the tests of excellence applied to these programs as well as others. (pp. 143-144)

In 1994, nearly a decade after first writing *The Neglected Majority*, Parnell remained committed to his personal vision of TPAD. He continued to see TPAD as "an applied learning program, aimed at excellence in preparing people in an excellent way" (D. Parnell, personal communication, January 24, 1994). Armed with Parnell's personal vision of TPAD, practitioners from throughout the country have moved forward and developed their own personal and shared visions of Tech Prep systems.

Preparing the Mission Statement

In comparison to a vision statement that is future-oriented, a mission statement provides direction for immediate action. Any mission statement should answer what, why, and how questions. It should tell the world *what* is being done, *why* it is being done, and *how* it is being accomplished. According to Pfeiffer, Goodstein, and Nolan (1989), a mission statement "will not only *reflect* the posture of the organization, but it will *determine* it" *(emphasis theirs)* (p. 117). Continuing with that idea, Pfeiffer et al. (1989) stated,

> The mission statement provides the context for formulating specific program strategies that the organization will engage in; it sets the arena in which the organization will compete; it determines how resources will be allocated by the organization; and it guides the general pattern of growth and direction the organization will follow for the future. (p. 117)

For Tech Prep, a mission statement needs to be created by key stakeholders as well as educators. It then needs to be kept in the forefront to help guide all of the local consortium's actions:

> The real key element with Tech Prep is [to] know what your mission is up front and hold to your mission. I think its critical to look at the broad purpose and mission of Tech Prep before you enter into a program. (T. Anderson, personal communication, January 27, 1994)

Crabbe (1993) described the development of a mission statement as a first step in developing Tech Prep. She suggested a four-step process:

1. Ask individuals to brainstorm their beliefs.
2. List beliefs shared by individuals regarding "students," "reasons for Tech Prep," "agencies to be involved," and "desired results."
3. Identify key words and phrases and reach consensus about beliefs.
4. Construct the mission statement using key words and phrases. (pp. 119-120)

Upon completion of this process, Crabbe suggests that . . .

> A Tech Prep mission statement will provide the link between the beliefs and values supporting Tech Prep and the activities that will actually be accomplished. It will provide the direction for all subsequent activities and services, and most importantly, it will provide a constancy of purpose and unifying theme for all involved. (p. 120)

Ten suggestions for evaluating mission statements are offered by Pfeiffer et al. (1989):

1. Use clear and understandable language.
2. Be brief so people can remember it.
3. Specify generally what the organization does.
4. Have a single strategic thrust.
5. Reflect the competence of the organization.
6. Be focused but allow for flexibility in implementation.
7. Serve as a template for decision making.
8. Reflect the values, beliefs, philosophies, and culture of the organization.
9. Provide a basis for creating attainable goals.
10. Be worded to serve as a source of inspiration and enthusiasm. (pp. 131-132)

To illustrate various elements of the planning process, one of the nation's Tech Prep demonstration sites provided copies of its mission statement, goals, and policies. The organization is Consortium to Restructure Education through Academic and Technological Excellence (CREATE) in Oklahoma City. Through the use of CREATE's plans, we hope to demystify the often interchanged terminology associated with planning. We also hope to show how one consortium has followed through with the development of these essential planning activities. To begin, the CREATE Tech Prep mission statement is as follows:

> Tech Prep is an industry and education partnership that is committed to providing a highly trained and motivated workforce, prepared to pursue lifelong learning in a changing technology society. It provides occupational pathways for students by preparing them for technologically advanced careers and postsecondary education. By emphasizing strong academic, technical, problem-solving, and critical-thinking skills, Tech Prep prepares students for the world of work and helps maintain a quality life in a changing society. (C. High, personal communication, February 22, 1994)

Setting Goals

Developing a shared vision and mission statement are critical steps in planning Tech Prep systems and restructuring education. A vision and mission statement also provide the basis for the development of clear and quantifiable goals. The most brilliant of mission statements becomes useless if it is not accompanied by goals that move it into achievable tasks. "Developing mission statements without stating a goal is like filling a bottomless pitcher with water. Without goals, . . . personnel will wander aimlessly through the . . . process without achieving anything of significance" (Lewis, 1983).

Goals are statements that translate a shared vision and mission statement into action. While vision is the image of where the people in an organization want to be in the future, and a mission statement shows the way an organization is intended to operate, goals can be short- or long-term statements of how to get there. They provide the specifications of what is to happen during the next day, month, or year (Block, 1987). Setting goals for Tech Prep is like setting goals for any endeavor. The following steps should be followed:

1. Communicate the vision and mission statement for Tech Prep throughout all levels of the organizations involved in a local consortium.
2. Encourage individuals from all institutions to identify goals that can
   - address student needs.
   - demonstrate an improved approach to education.
   - create efficient processes and procedures.
   - impact community and societal needs.
3. Rank the goals (again, involving individuals from across the entire consortium).
4. Reach consensus on the top priority goals.
5. Develop specific, quantifiable statements for these goals.

To exemplify goals for Tech Prep, six general goals that the CREATE consortium gave a high priority to prepare students for "today's sophisticated technological careers":

1. To encourage students to attain at least an associate degree or some other form of postsecondary certification.
2. To upgrade student competency by using "real world" curriculum for teaching academic subjects.
3. To prepare students for a smooth school-to-work transition.
4. To foster collaboration between the schools, the workplace, and the community.
5. To coordinate the efforts of secondary and postsecondary schools so students can achieve maximum results in minimum time.
6. To prepare students to be lifelong learners.

With general goals agreed upon, such as those of the CREATE consortium, the next step is to develop specific, quantifiable statements. Then, communication of the specific goals (optimally, also benchmarks) becomes of top importance. According to Jack Miller, coordinator of the Mt. Hood Regional Cooperative Consortium, the national Tech Prep demonstration site in Oregon, an annual report should be developed and distributed by a local consortium each year. According to Miller, an annual report can be extremely helpful in communicating the goals and accomplishments of a local consortium. An annual report should include the consortium's progress on meeting the past year's goals and a statement of the goals for the upcoming year.

Local consortia can also communicate goals by using promotional materials and through public forums. These strategies help to inform people inside and outside of a local consortium about what *is* happening and what *will be* happening. Of course, achievement of a consortium's goals is facilitated by consortium members who are committed to the goals, sincere about stakeholder group involvement, and clear about the intended impact of Tech Prep.

Changing Local Policies

While a vision, mission statement, and goals provide useful words and images to focus Tech Prep planning, policy is the tool that enables the actual operating of them. Local policies should reflect a shared vision. They should create and support an

environment where those involved feel comfortable, respected, and confident about the actions they should be taking to support the initiative. Accordingly, policy should be dynamic, not composed of inflexible truths. It requires review as the vision, mission, and goals evolve, changing in support of ever-changing achievements and challenges: "Policy statements are only important and useful if they are valid and correctly administered to give impetus" (Lewis, 1983, p. 60).

Once goals are adopted, it is important for each organization in a consortium to ensure its policies are congruent with the vision and mission statements. Not surprisingly, local, state, and federal policies have a profound impact on the initiation and growth of Tech Prep (Bragg et al., 1994; Office of Educational Research and Improvement, 1994). Depending on local circumstances, they can facilitate or impede progress. Adapting policy to accommodate the complexities of Tech Prep can provide a signal that a serious commitment is being made to this initiative.

It is, no doubt, much simpler to say that policy should be adopted or changed than to actually do it. Who is responsible for particular policies varies from state to state, and from one local consortium to another. Some policy issues require a state role (e.g., the granting of academic credit toward high school graduation for applied academic courses). Other policies, such as teaching loads, require local action and adaptation, although the jurisdiction for even these two policies may vary. Due to the restructuring inherent with Tech Prep, policy changes at the local and state level are sure to be needed. A challenge is in determining where and how these policy changes should occur. Recognizing the individuals involved in policy change is critical. Some policy adaptations require administrative action, some require the involvement and approval of governing boards, and some require action on the part of local and state personnel.

Leaders who currently operate Tech Prep initiatives indicate that many areas may require review or modification; however, the following areas are likely candidates for change:

- Student admission requirements
- Student graduation/degree requirements
- Work-based learning (e.g., internships, Co-op, youth apprenticeship)
- Joint planning time

- Program evaluation and data sharing
- Funding
- Scheduling and teaching loads
- Teacher evaluation (performance appraisal)

This list is by no means exhaustive; it was not intended to be. Just as a shared vision must reflect the uniqueness of its consortia, policies too must reflect this character. While policy adaptation of any of these areas may sound overwhelming, keeping a shared vision in mind when determining the most critical policy issues impacting the initiative is imperative. The following guidelines may help shape your thinking:

- Examine the multiple levels at which policy exists.
- Figure out which policies will impact the initiative.
- Determine if the policy is a formal written statement, an informal understanding, or something in-between. (Watch for hidden informal policy.)
- Identify who actually is in control of the policy and who influences the policy.
- Obtain input and/or involvement of these individuals or groups in modifying the policy.
- Move forward with necessary steps to put the policy into place (e.g., get board approval, solicit legislative action).

In a final example of policies implemented by the CREATE consortium, a struggle to reach consensus on an essential local policy is evident. According to Carla High, director of the CREATE demonstration site, when Tech Prep was first implemented, students were placed in applied academics courses without having their career paths clearly identified. She continues,

> Initially, students were placed due to low academic skills, not based on any sort of interest. Classes got labeled and tagged. Parents didn't want their kids in there. [However, now] we are turning it around and overcoming that. We've changed our placement process to enroll students by occupational interest rather than academic skill levels. (C. High, personal communication, December 15, 1994)

As a result of this dilemma, this local consortium developed a local policy statement that expands upon Oklahoma's definition of a Tech Prep student, which reads . . .

> A Tech Prep student is any eleventh or twelfth grade student who meets all the following criteria:

- is enrolled in an articulated vocational program, whether he/she has taken applied academics or not,
- has a Tech Prep career plan of study, and
- has made a statement of intent as a Tech Prep student.

CREATE's definition of a Tech Prep student adds . . .

A Tech Prep student is any student who has taken, or is currently enrolled in, an applied academics course and is on a six-year plan of study in
- Health/Human Services.
- Trade/Technology.
- Business Education.

Evident in this example is the importance of CREATE taking local actions to customize a state-level policy to meet local needs. Before the local definition was developed, CREATE found that its Tech Prep system was not serving all of the students it had hoped to serve. However, after taking action to write local policy, these two policy statements have combined to provide the basis for the CREATE consortium to define a Tech Prep student in such a way as to support its vision of Tech Prep.

In summary, a shared vision, mission statement, quantifiable goals, and local policies (coordinated with state and federal policies) create a sound foundation for Tech Prep. Strong local leadership is needed to ensure planning activities are carried out that reflect the unique character of local communities, schools, colleges, and employers. Plans that include a shared vision, mission statement, quantifiable goals, and clear policies make an important contribution to beginning any new Tech Prep system as well as ensuring the effectiveness of ongoing operations associated with existing initiatives.

Building Tech Prep Systems

When implementing any educational innovation, it is important for local leaders and stakeholders to communicate clearly, support efforts with needed resources, and provide mechanisms for determining the effectiveness of the actions taken. To implement systemic change successfully, Tech Prep should not be added on top of existing educational programs, becoming an added layer to current programs. If that approach is taken, it will surely fail. Rather, Tech Prep should be undertaken in conjunction with reconceptualizing the entire educational system, resulting in numerous changes over time. Implementation of any educational innovation, including Tech Prep, is not likely to occur in as straightforward

a manner as was once attributed to new program development where a curriculum progressed in linear fashion from design, to development, to implementation, and finally to evaluation (Fullan, 1993). Rarely, if ever, can local leaders expect to see Tech Prep follow such a simple, step-by-step evolution. Instead, the entire implementation process requires a continual questioning about what is being accomplished, how the initiative should be structured, who should be involved, and how success should be measured. This process provides the foundation for individual and organizational learning, a prerequisite to serious and meaningful educational reform.

The process of implementation is a continual one, and with it the process of reformation—improvement—is continual as well. A learning-by-doing approach to the change process may actually be instrumental in helping individuals become more knowledgeable about, committed to, and creative in implementing innovations. The notion of continuous implementation, tied to continuous improvement, is an idea that is unfamiliar (and uncomfortable) to many. However, it is crucial to the eventual success of Tech Prep. Finding ways to facilitate this kind of environment is the mutual responsibility of all the stakeholders involved.

The atmosphere for this type of highly customized implementation activity requires a great deal of local flexibility (Sizer, 1985). Having sufficient agility to move through implementation and create approaches that make sense to local consortia are important to ensure long-term ownership. In order to accomplish this goal, local leaders need support from state and federal officials. Statewide structures for curriculum, professional development, evaluation, and other components are essential to ensuring change is carried out effectively at the local level.

The national Tech Prep leaders we interviewed who provided state-level perspectives described the need for local flexibility so that a community's educational, business, and community resources can be used efficiently. They advocated an active state role to facilitate local efforts. Dick Miguel, Vocational Director in Illinois, recommended an implementation process that would facilitate local progress yet also work toward state "standardization." Another state Tech Prep leader, Gary Crocker of Maine, made the following recommendation for a state-facilitated, grassroots approach:

> One idea I would wholeheartedly like to promote to others is that Tech Prep, among all other education reform movements that I've seen attempted, is

> being developed from the ground up, from the grassroots. It is not being fed from the top in terms of what you must do or you must not do. Our five regional consortia are in some ways operating very differently. Yet they're coming up with some of the same answers because the problems are fairly common.
>
> Local control is a major issue in the state of Maine. We want this to be seen as a local phenomenon, and we are treating it that way, not only in writing and in words, but in actions. I see my role as more of a facilitator, a supporter, and an encourager. And I would encourage other states to consider taking an approach that allows the program to grow from the ground up rather than trying to force it from the top down. (G. Crocker, personal communication, January 21, 1994)

Defining the Key Components

Since the time Tech Prep first began to be implemented in the 1980s, educators considered ways to arrange the various key components of Tech Prep to create effective educational initiatives. The central concept of this section is that key components can be viewed as the concepts, actions, processes, or procedures that combine to create Tech Prep systems. Putting it simply, they are the parts that are essential to creating the system as a whole. Presented in Figure 1 are only twenty of a potentially endless array of components that, to a greater or lesser extent, appear in the various Tech Prep systems that are being deployed at the local level across the nation (Bragg et al., 1994). Listed in alphabetical order in this figure are the twenty components and a brief definition of each. Also provided are a few selected resources for further reference. Again, these resources are not intended to be an exhaustive list on each topic. Rather, they represent a place to begin to create common understanding and consensus about the parts that should make up a local Tech Prep system.

Figure 1

Tech Prep Components, Definitions, and Suggested Further Reading

Tech Prep Component	Definition	Resources for Further Reading
Alternative or authentic assessment	Assessment (evaluation) of student learning using tools, processes, and procedures other than standardized tests. Authentic assessment is especially concerned with measuring real-life student performances.	Dornsife (in press) Mabry (1992)
Applied academics	Academic courses and curriculum based largely on contextual teaching and learning processes (e.g., Principles of Technology by CORD).	Bottoms, Presson, & Johnson (1992) Hull (1993) SCANS (1991)
Articulation	Formal linkages of courses, programs, and curricula among levels of education to create a continuous progression of teaching and learning.	Dornsife (1992b) Hull & Parnell (1991) Commission on the Future of Community Colleges (1988)
Business and industry partnerships	Formal and mutually beneficial relationships between business, industry, and labor, and educational entities, often specifically focused on creating work-based learning experiences for students.	National Alliance of Business (1987, 1989)
Career awareness and exploration	Strategies used with students of all ages but particularly with pre-high school students to promote awareness of careers and to encourage investigation of them, including video and materials development, career days, job shadowing, and mentoring.	Chew (1993) National Occupational Information Coordinating Council (1989)
Consortium building	The development of an organization comprised of at least one secondary school and one postsecondary educational institution. Other organizations such as businesses, labor, or community-based agencies sometimes join a consortium.	Brustein (1993) Key (1991)

Figure 1 (cont.)

Tech Prep Component	Definition	Resources for Further Reading
Core curriculum (2+2)	A carefully sequenced set of courses beginning in the eleventh grade and culminating in the fourteenth grade. This educational program must have a common core of required courses in math, science, communications (or applied academics), and technologies that leads to an associate degree, apprenticeship, or two-year certificate in a career field.	Brustein (1993) Edling (1992)
Equal access for members of special populations	Policies and processes to ensure special population students have the same opportunity to enter Tech Prep as other students.	Brustein (1993) National Institute on Disability & Rehabilitation Research (NIDRR, 1994) Maddy-Bernstein, Matias, Cunanan, Krall, & Iliff (in press)
Guidance and counseling	Career guidance and counseling programs should focus, in part, on assisting students to increase self-knowledge; exploring educational and occupational options; and planning, preparing, and transitioning into careers. Counselors can help students understand Tech Prep and how it can help them to fulfill their personal, career, or educational aspirations.	Chew (1993) Maddy-Bernstein (1994)
Integration of vocational and academic education	Numerous instructional or curricular efforts designed to reinforce, blend, or merge vocational and academic knowledge and skills (e.g., applied academics, career academies, occupational cluster schools).	Ascher & Flaxman (1993) Berryman & Bailey (1992) Grubb et al. (1991, 1992) Stern et al. (1992)

Figure 1 (cont.)

Tech Prep Component	Definition	Resources for Further Reading
Joint planning time	Time set aside in the school (work) schedule where vocational and academic faculty, secondary and postsecondary personnel, educators and employers can plan.	McKinney et al. (1988) Raywid (1993)
Marketing and promotions	Strategies to create awareness, interest, and support for Tech Prep through the use of such tactics as meetings, workshops, media, and newsletters.	Williamson (1993)
New instructional strategies	Alternative teaching and learning strategies offered in place of traditional, didactic teaching methods (e.g., cooperative learning, higher-order thinking strategies).	Gardner (1991) Johnson & Thomas (1992) Raizen (1989)
Outcomes-based education (OBE)	An approach to education that focuses on proficiency of specific knowledge and skills, referred to as outcomes. OBE delineates what students should know and do as well as new accountability systems.	Evans & King (1994) Spady (1994)
Planning and implementation	Efforts made by state agencies and local consortia to design, develop, and implement Tech Prep.	Bragg et al. (1994) Office of Educational Research & Improvement (1994)
Preparatory services	Services to students not yet enrolled in Tech Prep to help them prepare to participate such as outreach, career counseling, or vocational assessment.	Brustein (1993)
Professional development	Various forms of education, training, and developmental activities used to prepare stakeholder representatives to play an active role.	Little & Threatt (1992) Little (1993)
Program evaluation	Actions taken to determine the quality, effectiveness, and/or impact of Tech Prep initiatives during the developmental stages (i.e., formative) and once full-scale implementation has occurred (i.e., summative).	Hammons (1992) Hoachlander et al. (1992)

Figure 1 (cont.)

Tech Prep Component	Definition	Resources for Further Reading
Team building	Organizing and implementing teams with representatives of key stakeholder groups.	Crabbe (1993) Kirby & Layton (1992)
Work-based learning	Instruction that is deliberate, formal, and strategically linked to learning in the workplace to learning in school or college (e.g., youth apprenticeship, cooperative education, and professional/clinical experiences).	General Accounting Office (GAO, 1991) Hamilton (1990)

Tech Prep systems that are designed and implemented by local consortia can configure these key components in various ways to meet particular student needs and reach specified outcomes. This flexibility in implementation is extremely important. As a local consortium contemplates implementation strategies to build a Tech Prep system, it is important to consider the shared vision created when beginning the initiative. It would also be beneficial to revisit the six core concepts of education set forth earlier in this document.

- First Core Concept—Tech Prep should be grounded in an integrated and authentic core curriculum at both the secondary and postsecondary levels. Tech Prep curriculum and instruction must not only provide a more interesting and effective approach to teaching and learning, but stop the perpetuation of tracking.

- Second Core Concept—Tech Prep should link secondary and postsecondary education to facilitate smooth transitions, reduce failure and dropout rates, and reduce costly inefficiencies for students. It should increase educational and employment options for students; it must not be terminal.

- Third Core Concept—Tech Prep should be a highly relevant approach to teaching and learning. Work-based learning provides a valuable tool to create this approach through active use of the workplace and surrounding community.

- Fourth Core Concept—Tech Prep should be an approach that focuses on outcomes and increased student performance, supporting other outcomes-based federal

initiatives such as the federal vocational education legislation, School-to-Work Opportunities, and the Goals 2000: Educate America Act.

- Fifth Core Concept—Tech Prep should be an accessible and viable option for all students. It must not be a program targeted to a certain class rank percentile group but must offer an educational option that is stimulating for any student who chooses it.

- Sixth Core Concept:—Tech Prep should be implemented by using a highly collaborative approach built upon the network of people and organizations that form local consortia.

Keeping your own consortium's shared vision, mission, and goals in the forefront, along with these six core concepts and any others identified by the group is very important. Together, these ideas form guiding principles that can make a significant contribution to restructuring education utilizing Tech Prep systems.

Deploying Tech Prep Systems

Similarly to any educational innovation, the concept of Tech Prep is changing as it spreads throughout the country. In this section, five Tech Prep systems are introduced to provide alternative perspectives on how these six core concepts and many of the key components defined previously in this section can be addressed in future Tech Prep implementation efforts. (See Figure 2 for a summary of how the five systems address the six core concepts discussed in this document.)

Figure 2

Tech Prep Systems on the Six Core Concepts of Education

Tech Prep System	Integrated and Authentic	Articulated	School-to-Work Connected	Inclusive	Outcomes-Focused	Collaborative
Integrated Tech Prep	• Career academies • Occupational clusters/career paths • Authentic instruction	Formal agreements secondary to postsecondary	• Career awareness and exploration • Internships • Mentoring • Integrated work experiences	All students	• Academic and technical attainment, further education, and employment • Authentic assessment and prog. evaluation	• Interdisciplinary/ stakeholder teams • Formal partnering with business, industry, and labor (B/I/L)
Work-Based Tech Prep	• Career academies • Occupational clusters/career paths • Authentic instruction	Formal agreements secondary to postsecondary	• 2+2 youth apprenticeships • Cooperative ed. • Prof./clinical experiences • Formal apprenticeships	All students	• Academic and technical attainment, further education, and employment • Assessment and certification of industry standards	• Interdisciplinary/ stakeholder teams • Formal partnering and financial support from B/I/L
Tech Prep Baccalaureate Degree (TPBD)	• Inverted curriculum design at postsec. level • Cooperative learning	Formal agreements secondary to 2-year and/or 4-year postsecondary	• Cooperative ed. • Prof./clinical experiences	All students	Baccalaureate degree attainment and employment	• Collaboration to align and reform curriculum • Formal support from B/I/L
Pre-Tech Prep	• Interdisciplinary, project-based • Team, cooperative learning	Formal agreements elementary to secondary to postsecondary	• Career awareness • Mentoring • Job shadowing	All students beginning in elementary or middle/junior high	Academic achievement and continuation in school	Collaboration to align and reform curriculum
Adult Tech Prep	• TPAD-type curriculum with SCANS • Interdisciplinary, project-based	Transition support from GED to postsecondary	• Supplement adults' regular employment with work-based learning	Provides access so nontraditional adult students can join all others in Tech Prep	• Program completion and employment • Individual assessment upon entry and exit	Collaboration to develop and support nontraditional adult students

Integrated Tech Prep is being implemented by local consortia that are combining ideas associated with Tech Prep with concepts linked to vocational and academic integration. Although carried out by relatively few according to the recent research of Bragg et al. (1994), consortia attempting this approach seem stimulated by local faculty-driven curriculum development in lieu of off-the-shelf applied academics courses. The integrated Tech Prep model is also being fueled by efforts of NCRVE to assist large urban school districts with Tech Prep implementation. Through summer institutes conducted in 1992 and 1993 and other regional meetings, interdisciplinary teams of urban educators from thirty major metropolitan areas across the nation, including New York City, Chicago, and Los Angeles, have been introduced to the integrated Tech Prep model.

Plans developed by these teams specify comprehensive vocational and academic integration as the core curriculum for Tech Prep (Benson, 1993). Typically, consortia utilize existing integration approaches or experiment with new derivations of them. Whereas the methodologies for Tech Prep curriculum integration are relatively new, two approaches that appear to provide a sound foundation for the integrated Tech Prep model are career academies and occupational clusters, career paths, or simply cluster schools. Career academies are schools-within-schools that usually include a small cadre of faculty members representing the academic disciplines of math, science, and English, and a specific career field. With the secondary-to-postsecondary articulation required by Tech Prep, virtually any occupation that is articulated between a consortium's secondary and postsecondary institutions or between secondary schools and apprenticeships could provide the basis for a career academy.

In the best of situations, a consortium could implement several career academies in different occupational areas. This approach could create an efficient use of facilities, personnel, and equipment in areas where resources are limited, but commuting distances are not so great as to preclude students from traveling to participate in an academy located in another consortium school. Career academy faculty teams could include vocational and academic faculty from any of the member secondary or postsecondary schools. Formal partnerships with business and industry could also facilitate school-to-work opportunities through internships or other more intensive work-based learning.

The second core curriculum used by the integrated Tech Prep model is the occupational clusters/career path model or cluster school approach: "[L]ike the

occupational focus of each [career] academy, occupational clusters facilitate cooperation among teachers, facilitate both horizontal and vertical alignment, and provide academic teachers with obvious vocational emphases to incorporate their classes" (Andrew & Grubb, 1992, p. 125). An obvious difference between the career academy and career cluster model is scale. With the latter approach, all of a consortium's schools and two-year colleges can be organized collectively to deliver vocational and academic education around similar career clusters. At the secondary level, the primary focus of these career clusters is to provide a context for learning that spans vocational and academic subjects, motivates students to attain advanced competencies, enhances career exploration opportunities for students, and encourages students to aspire to higher levels of academic and occupational preparation. At the postsecondary level, selection of a specialty within a career cluster is necessary; however, even at this level, the provision for understanding fundamental knowledge that spans a broad career cluster area remains important for later career mobility. Again, as with career academies, student learning is enhanced when attention is paid to creating work experiences that support career clusters. When either the career academy or career cluster model is used for Tech Prep core curriculum, more effective educational experiences seem to occur when support services such as guidance and counseling are available to address student needs.

The state of Oregon is attempting to implement the integrated Tech Prep model statewide by institutionalizing six career strands: (1) arts and communication, (2) business and management, (3) health services, (4) human services, (5) industrial and engineering systems, and (6) natural resource systems. These strands are intended to link vocational and academic subjects across elementary, secondary, and postsecondary curricula. An intriguing aspect of Oregon's approach is the use of these broad career clusters to bring together the theory and practice inherent in occupations requiring different levels of educational preparation, ranging from high school to advanced graduate study. Students in a particular cluster such as industrial and engineering systems may eventually pursue careers in very different occupations, for example, maintenance, technician, engineer, or scientist. By taking this approach, Oregon hopes to replace existing school tracks that segregate students by class and income groups with career pathways that provide a more relevant approach to education and more options for students.

Work-Based Tech Prep—Since its inception, Tech Prep has been primarily a school-based reform. However, because the STWO legislation will demand a work-based

component for Tech Prep and stronger partnerships between educators and employers, it is logical to assume that Tech Prep will evolve in this direction. Although work-based learning occurs infrequently with Tech Prep (Bragg et al., 1994), work-based Tech Prep systems focus on creating learning experiences that capitalize on the best that school and work have to offer in developing vocational and academic competencies. Where work-based Tech Prep is employed, student learning should be deliberately structured and strategically organized by instructional staff, employers, and sometimes other community members to link learning in the workplace to students' school- and college-based learning experiences. Formal instructional plans should directly relate students' school-based and work-based learning to their career goals. Work-based learning can profit from incorporating SCANS competencies to facilitate the linkage between vocational and academic education. Examples of work-based opportunities that fit this Tech Prep approach are youth apprenticeships, cooperative education, postsecondary/clinical experiences, and formal registered apprenticeships. Employer-sponsored mentors and coaches are essential to the success of any of these approaches.

A consortium that is developing such a work-based Tech Prep system is located in Rockford, Illinois. Beginning in 1990, this consortium launched Tech Prep utilizing interdisciplinary teams composed of high school and college personnel along with local business representatives. In addition, a committed business, industry, and labor steering committee assisted these interdisciplinary teams to design the consortium's core curriculum. Building on these strong collaborative efforts and a grant from the U.S. Department of Labor's Bureau of Apprenticeship and Training, the Tech Prep consortium established two youth apprenticeship programs in the manufacturing industry, one beginning in 1992 and another in 1993. The consortium's primary goal has been to establish apprenticeship programs that can provide viable work-site learning and fortify existing Tech Prep partnerships already based on strong education-business relationships.

High schools that are a part of this Tech Prep consortium are involved in integration throughout the vocational and academic curriculum, rather than in using applied academics. Integration occurs through the collaborative work of interdisciplinary teams of teachers that actively reinforce related concepts (e.g., geometry in building trades or computer-aided design [CAD]). Many of these teachers have participated in summer professional development experiences enabling them to visit local employer work sites and incorporate their own learning into the school-based component of the curriculum. Integration has

been reinforced further in students' work-based learning experiences by workplace mentors who have participated in training on the basics of pedagogy. The mentor training began at the start of the school year and continues on a weekly basis through meetings with teams of teachers.

Like several other attempts at youth apprenticeship, Rockford's Tech Prep apprenticeship program has enrolled a small group of high school students (a number of whom represent special population groups) at local manufacturing academy sites provided by two of the sixteen local firms that support the program. Eleventh-grade students who complete the program receive a scholarship based on their academic and work performance. Twelfth-grade students are paid for four hours of their school/work day. Graduates of the high school phase of the program can transition into postsecondary education at the local two-year community college, Rock Valley College. At the end of the entire apprenticeship program, students received registered apprenticeship credentials and an applied associate degree.

Tech Prep Baccalaureate Degree (TPBD)—The third system emphasizes formal articulation as a critical component. The TPAD model designates the associate degree as the preferred credential for Tech Prep. Rather, TPBD recognizes that the baccalaureate degree is the preferred credential by many students, parents, and educators. Although the Tech Prep Education Act of Perkins II endorses the associate degree as the capstone credential for Tech Prep, it also encourages local consortia to develop programs that enable students to attain the baccalaureate degree, thereby creating 2+2+2 programs. Unfortunately, local consortia have had difficulty articulating Tech Prep with baccalaureate-degree programs because many state colleges and universities do not recognize applied academic courses for college admission (Conley, 1994). The unwavering devotion of four-year colleges and universities to traditional academic preparation (while often advocating educational reform of the sort potentially provided by Tech Prep) has made this level of articulation very difficult in all but a few states.

Currently, the Minnesota Technical College System and the University of Minnesota are entering into an agreement to develop an applied-baccalaureate program in the engineering technology field culminating in a Tech Prep Baccalaureate Degree (TPBD) having a 2+2+2 articulated curriculum (Cabrale & Johnson, 1993). A similar system has been applied to the Bachelor of Science degree in Advanced Technical Studies at Southern

Illinois University and a vocational teacher education program at the Ohio State University (Troutt-Ervin & Adams, 1992). In the state of Idaho, all four-year higher education institutions have created applied baccalaureate degrees. Some are called bachelor of applied technology; some are referred to as bachelor of applied science. No matter, all higher education institutions in Idaho have agreed to articulate these Tech Prep programs at face value to applied baccalaureate programs (T. Anderson, personal communication, January 27, 1994).

Although still in its infancy, the TPBD system is increasingly capturing the attention of educators who envision the baccalaureate degree as an appropriate credential for Tech Prep students and who want to provide their students with more higher education options. This option offers hope for transforming applied associate degree programs currently thought of as "terminal" into viable transfer programs and for expanding capstone postsecondary occupational-technical transfer programs far beyond what is typically available today (see Prager, 1993). An important feature of TPBD is advanced curriculum articulation, rather than time-shortened or advanced placement articulation approaches. In addition, the core curriculum at the postsecondary level uses vocational and academic integration involving hands-on technical courses and related academics at the technical college level, and more abstract theoretical courses and other general education requirements at the university level.

Whereas this curriculum approach is contrary to the conventional wisdom of teaching theory before practice, it is gaining favor from such unexpected places as traditional four-year engineering programs. In a recent article, Carl R. Peterson (1993, p. 28) indicated that some engineering faculty may see an approach that integrates theory and practice starting at the beginning of the curriculum as intruding upon "traditional sacred ground." Yet, he defends the approach as a way to build upon students' previous learning experiences and facilitate cooperative learning and creative problem solving. In addition, the long-standing tradition of four-year colleges using cooperative education and professional/clinical experiences provides a logical basis for providing work-based learning. Use of this system seems especially feasible in occupational areas where transfer from two- to four-year colleges already occurs at a relatively high rate (e.g., health, business, agriculture, and education.)

Pre-Tech Prep—A fourth system extends the articulation and integration concepts downward into junior high, middle school, or possibly into elementary school to set the stage for Tech Prep and integration later in students' schooling experiences. A clear mandate of the Tech Prep Education Act is to develop programs that have a 2+2 curriculum configuration. Unfortunately this design falls short of reaching students who are prone to drop out of school earlier than the eleventh grade. Recognizing the importance of this issue, some local consortia have decided to begin a Tech Prep-like education prior to grade eleven, thereby creating legitimate 4+2 curriculum (i.e., all four years of high school plus two years of postsecondary education). Sometimes these programs are connected to elementary and middle/junior high school programs that utilize components that are also consistent with Tech Prep philosophies.

Local Tech Prep consortia utilizing this "preparatory" Tech Prep or pre-Tech Prep system have sometimes committed themselves to vertical curriculum alignment involving the elementary, secondary, and postsecondary levels. The model relies heavily on enhancing teaching and learning through interdisciplinary, project-based curriculum and team-centered cooperative learning strategies beginning at least in the middle/junior high school years and sometimes as early as elementary school. Career awareness and exploration through mentoring and job shadowing experiences are important to help students begin to connect learning to life outside of school. Remedial services are provided to help students improve their educational achievement, particularly students recognized early as at risk of dropping out. This pre-Tech Prep system views the connections among school-based knowledge, the community, and careers as a valuable way to motivate and recognize the interests and talents of very young students. The intent is not to force students to make early career decisions but rather to encourage students to see a reason to stay in school and aspire to higher levels of academic performance.

A local pre-Tech Prep system that typifies many of these components is in Catawba County, North Carolina. Known as Mid-Tech, this local initiative involves approximately thirty-five middle-school students and three faculty in a two-year long school-within-a-school housed at the Catawba Valley Community College (CVCC). Together, the faculty cover the areas of math, science, communications, social studies, and vocational education. The program offers integrated curriculum across vocational and academic subjects, including rotation through any of the career areas offered at CVCC. (The furniture and textile industries dominate the local labor market.) A primary goal of the curriculum is to

"cause real and true integration of academic and vocational competencies through the use of a team relationship between the teachers" (T. Jones, personal communication, March 21, 1994). This team of teachers is actively developing thematic teaching units that illustrate how vocational and academic content can be integrated. Through Mid-Tech, educators in Catawba County intend to help above-average ability, low-achieving students gain confidence in themselves, stay motivated to achieve in school, and see the potential of future educational opportunities and related careers. After completing Mid-Tech, students can elect to participate in whatever high school curriculum they choose, whether it be predominately college prep or Tech Prep.

Adult Tech Prep—The fifth system focuses on improving access to postsecondary education for adults who missed out on Tech Prep in high school. Adult Tech Prep is designed to meet the needs of the large and growing population of nontraditional students enrolled in two-year colleges. Since the majority of students in these colleges have not matriculated directly from high school but, rather, entered college later in life, an alternative Tech Prep system is needed for them. This approach is sometimes used to meet the needs of adult students who have not had adequate high school preparation. One approach to Adult Tech Prep is referred to as the bridge program (Hull, 1993). In this option, adult students and recent high school graduates who were unable to enroll in the high school phase of Tech Prep are assessed to determine their academic competencies and then placed in applied academics courses, or traditional academic and technical courses of the two-year college.

A related approach to Adult Tech Prep was developed at Black Hawk College (BHC) in Moline, Illinois. In this program, adult basic education students complete the GED and then transition into two-year college classes alongside Tech Prep high school graduates. This local Tech Prep system is similar to what Grubb and Kraskouskas (1992) described as remediation programs with an occupational focus, where remedial courses in math and English are taught simultaneously with beginning occupational courses. At BHC, a team of faculty and staff developed Adult Tech Prep courses consistent with the curriculum offered throughout the rest of the local consortium. Key courses in the program include applied academics, computer literacy, and job readiness. To further integrate the curriculum, this approach emphasizes the SCANS competencies and interdisciplinary projects. Overall, the system is intended to provide adult students with the opportunity to

complete the GED, transition back into and out of college with Tech Prep credentials, and ultimately reach the goal of successful employment.

In the future, these types of Tech Prep systems are bound to spread and still other systems will emerge as practitioners experiment with combining the key components and core concepts of Tech Prep. Each of these and other yet-to-be-developed systems will present the opportunity to advance Tech Prep as a vehicle for educational restructuring. Not surprisingly, implementation of any new models will not be easy. Barriers to changing America's educational system are enormous—even insurmountable in the view of some. However, by recognizing and addressing implementation issues, the opportunity to resolve them may be realized.

Overcoming Barriers

Barriers to implementing any lasting reform of education are inevitable. Topping the list of barriers are the lack of resources in money, time, and qualified people; difficulties in getting leaders to champion change at the local, state, or federal levels; the lack of clarity and quality in various reform strategies; the rigidity of reform models and processes; the inadequacy of teacher preparation, professional development, and technical assistance; and the incompatibility of reform policies across the existing educational system (see, for example, Fullan, 1991). Many of these barriers are similar to those associated with Tech Prep, including insufficient resources, difficulties with getting time and authority for faculty to do curriculum work, problems with local and state leader commitment, ambiguity in Tech Prep definitions and goals, and poor quality and inappropriate professional development and program evaluation (Andrew & Grubb, 1992; Dornsife, 1992b; Hoerner et al., 1992; Layton & Bragg, 1992; Ramer, 1991).

These serious issues appear to be the areas most likely to receive attention because of their similarity to the barriers impacting educational reform in general. Based on a factor analysis of a national survey of local Tech Prep coordinators, Bragg et al. (1994) identified five common factors that help explain the barriers to local Tech Prep implementation. This section is focused on the barriers that are most closely aligned with Tech Prep, according to local coordinators. The following are the five barriers:

1. Resistance to Tech Prep
2. Lack of clear policies

3. Stakeholder disinterest
4. Lack of resources (time, money, and personnel)
5. Lack of support from the postsecondary level

The first factor identified in the national survey of local Tech Prep coordinators was labeled *resistance to Tech Prep*. Fourteen of the fifty barriers listed in the survey appear in this first factor. Among these fourteen items were resistance from academic educators, belief that Tech Prep is a fad, negative attitude toward vocational education, looking at Tech Prep as vocational education, and failure of educators to change. This factor is characterized by resistance to Tech Prep from several groups: academic educators, vocational educators, administrators, and counselors—all primarily at the secondary level. Problems inherent in getting vocational and academic educators to collaborate, and the failure of educators to change are evident as well. The problem of negative attitudes toward vocational education and a fleeting image of Tech Prep are also apparent.

At such an early point in national implementation of Tech Prep, few local consortia have fully developed a core curriculum. Most describe curriculum at a developmental or early implementation stage (Bragg et al., 1994). This fact may be a primary contributor to the perception that Tech Prep is simply another name for vocational education. With the complicity suggested by this factor, difficulties in getting local consortia to rally support from some of the stakeholder groups most needed to carry out the implementation process are not surprising. Predominant among these difficulties is the challenge in bridging the gap between vocational and academic education. To overcome this barrier—to bridge the gap between those who are *resistant* to Tech Prep and those who are *ready* for it—will require a great deal of time, communication, and collaboration to build consensus for an approach that all can support.

The second factor can be viewed as a *lack of clear policy* for Tech Prep. The survey items that were important to this factor were a lack of clear local, state, and federal policy for Tech Prep; lack of support from both secondary and postsecondary agencies; turnover of local and state leaders; and too much flexibility in local implementation of Tech Prep. This barrier is characterized by too limited efforts at all levels to define Tech Prep policy in ways that practitioners can understand and rally behind. This factor provides an image of a policy that appears to local coordinators to be discontinuous and unsynchronized from the top levels on down. With the advent of STWO, this perception can only increase

in prevalence. This factor points to the need for leaders at every level to communicate a clear vision and supporting policies, sustain momentum, and ensure continuity throughout the implementation process.

An area where the lack of clear policy is most apparent is in the area of defining an appropriate student population for Tech Prep and then designing a core curriculum for that population. Several states and local consortia have elected to reconceptualize (or rename) existing college, general, and vocational tracks as college prep and Tech Prep, or college prep, Tech Prep, and vocational prep (Bragg et al., 1994). Although quick to point out these tracks are not intended to stifle student options, the impression that Tech Prep is being used to replace old tracks or, at best, create better tracks seems inevitable. To overcome this dilemma, practitioners should begin contemplating Tech Prep not as vocational education or academic education, or even a marriage of the two, but as the foundation for general education necessary for *all* students, similar to the philosophical perspective held by John Dewey discussed earlier in this document. New curricula that can break down the walls between high school tracks and focus on education for *all* is desperately needed.

The third factor can be seen as *stakeholder disinterest*. Items that make up this factor are lack of student and parental interest in Tech Prep, an inability of young people to make early career decisions, a lack of jobs in a region for Tech Prep graduates, and a lack of support from business/industry and labor. In this factor, resistance to Tech Prep can be seen from several of the groups that are also key stakeholder groups: students, parents, employers, and labor. Particularly evident in this factor is resistance from students and parents to an educational concept they may view as linked too early or too narrowly to work. It seems possible that even after a few years of federal support, relatively few high school students or their parents know about Tech Prep and, if they do, rarely do they have a full understanding of what it entails.

The complex relationship between the educational aspirations of students, the aspirations of parents for their children; and the needs of business, industry, and labor are also apparent in this factor. Without the support of these potentially contentious groups, Tech Prep may have difficulty reaching full-scale implementation (Gray, 1994). Thus far, Tech Prep has largely been a school-to-college reform; however, the addition of the school-to-work component is likely to raise new issues. Counter to what would be hoped to occur

with STWO initiatives, employers have played a relatively low-key role in Tech Prep in some consortia. Although many local consortia consider them to be "partners," few reported employers making any substantial financial commitments to local Tech Prep implementation (Bragg et al., 1994). When STWO becomes more visible, will business step forward as a more active partner in Tech Prep systems? Some fear they will not unless both sides first acknowledge and address past problems and openly and honestly consider future needs. To start building partnerships between school and work, both sides must begin to listen and cooperate. All those involved—educators and their students, employers and their employees—have a stake in the outcome.

The fourth factor has as its focus a *lack of resources*. This factor contained the following survey items: lack of funds for curriculum reform; funding for Tech Prep is limited to vocational education sources; limitations in using Tech Prep funds; little time for joint planning by faculty; lack of staff, time, and money for Tech Prep; and failure to employ a Tech Prep consortium coordinator full time. This factor can be seen as an expression of a hunger for resources that are generally understood to be required for implementation, especially funds, people, and time. It seems that these resources are either not available in satisfactory amounts or are limited in the ways they can be used.

Apparently, local practitioners see themselves as trying to do a job without the proper tools, especially when considering the enormous change that must be undertaken to reduce the impact of the other barriers. In fact, the lack of joint planning time among vocational and academic or secondary and postsecondary faculty was the top ranked of fifty barriers to local implementation (Bragg et al., 1994). This barrier seems indicative of the problems created when resources are not adequate to support faculty in their efforts to design and develop new curriculum. To overcome this barrier, it is absolutely essential that new resources, or resources diverted from other areas, be focused on implementation of Tech Prep systems.

The fifth factor can be seen as a *lack of cooperation from postsecondary education*. Items contained in this factor include resistance from postsecondary schools to introduce Tech Prep, resistance from postsecondary administrators to Tech Prep, failure of postsecondary schools to accommodate Tech Prep students, difficulty in developing formal articulation agreements, turf battles between secondary and postsecondary educators, and difficulty reaching consensus among curriculum planners on reform strategies. This factor

focuses on problems with the two-year postsecondary schools engaging with secondary schools in serious implementation activity. Apparently some postsecondary administrators and faculty resist efforts to introduce Tech Prep into their institutions, to make necessary changes for new students and programs, and to cooperate with colleagues at the secondary level.

Turf battles have occurred between secondary and postsecondary education since formal articulation efforts began (Dornsife, 1992b; Ramer, 1991). Often problems over control of curriculum and distribution of resources have stimulated the controversies. Also, educators at either level have feared that formal linkages will force them to give up practices they believe work successfully. Community college faculty sometimes seem reticent to having what is perceived to be the secondary pedagogy of Tech Prep thrust upon them. Similar to their four-year college counterparts, community college faculty have also questioned the adequacy of preparation of high school students. On the other hand, Tech Prep has concentrated on secondary education, sometimes giving little attention or resources to postsecondary curriculum reform. Tech Prep cannot work in isolation. A true partnership must be forged between secondary and postsecondary education. Issues surrounding the design of postsecondary core curriculum must be resolved to ensure a strong collegiate role. If this barrier is not resolved, students who complete the secondary portion of Tech Prep and expect to continue on at the postsecondary level will not be served, the repercussions of which could be disastrous to the survival of any Tech Prep system.

In summary, emerging Tech Prep models can facilitate the six core concepts of integrated and authentic core curriculum, formal articulation, school-to-work opportunities, outcomes-focused curriculum, inclusive education, and collaborative implementation. However, barriers do exist. Resistance to Tech Prep, a lack of clear policy, stakeholder disinterest, a lack of resources, and turf battles between secondary and postsecondary educators all impact progress made by local systems. Difficulties forming lasting ties between vocational and academic education, the secondary and postsecondary levels, and school and work are at the center of some of the most serious concerns. To overcome these barriers will require more knowledge about how Tech Prep is being carried out and how it is impacting teaching and learning processes. Efforts to measure the progress of Tech Prep on an ongoing basis may be a key to ensuring Tech Prep is making a meaningful contribution to the educational system as a whole.

Measuring Progress

Evaluation should begin during the planning process, continue into the implementation phase, and become a part of the ongoing operation of any Tech Prep initiative. Throughout all of this activity, evaluation can be used to (1) examine the effectiveness of the implementation process, (2) assess the extent to which learner outcomes are being met, and (3) ensure that continuous improvement is a constant goal. Evaluation to achieve these three goals is crucial to determining the quality, effectiveness, and impact of goals, processes, and outcomes associated with Tech Prep. The data collection methods used for evaluation can be diverse, ranging from qualitative observations to highly quantitative, statistical analyses. Regardless, it is important for local leaders and stakeholder groups to be involved from the earliest stages of a Tech Prep initiative to ensure that a highly relevant and useful approach to evaluation is created. By doing so, a local consortium can establish a basis for an initiative that demonstrates accountability, delivers on its intended outcomes, and ensures continuous improvement.

A conference report of the Summit on Tech Prep held by NCRVE in June 1992 emphasized the importance of a comprehensive evaluation system for Tech Prep. The NCRVE report recommended the creation of evaluation processes that

- focus on both formative processes and summative outcomes,
- include accountability for all parties in a local consortium,
- show the broader purpose of Tech Prep, going beyond what is typically associated with vocational education programs, and
- determine the effectiveness of the implementation process.

Ultimately, all aspects of a Tech Prep initiative must be directed toward achieving its intended outcome—improved student learning. It is essential that local evaluation be put into place to ensure Tech Prep meets this important goal on a continual basis. Gisela Harkin of the U.S. Department of Vocational and Adult Education reinforces this point:

> The most basic purposes for evaluating Tech Prep programs are to ensure that the program produces intended results for the students and also that those results are used to initiate program improvement activities. Program effectiveness is at the heart of program evaluation. I would look at program processes and outcomes based on the Tech Prep objectives of preparing students for the workforce, raising the quality of vocational and academic learning experiences, and promoting systemic change. (G. Harkin, personal communication, February 4, 1994)

Conducting Program Evaluation

Unfortunately, program evaluation has been one of the most neglected components of Tech Prep. Early on, McKinney et al. (1988) reported a lack of attention paid to program evaluation for articulated vocational-technical education programs. More recently, a study reported by Dornsife (1992a) indicated that evaluation was a weak component of local Tech Prep programs. Her study indicated routine use of program evaluation occurred with only the most advanced Tech Prep sites, and there the primary goal was to track course enrollments, and sometimes also to monitor program completions and job placements. By and large, past measures have focused on compliance-oriented evaluation for the purposes of demonstrating accountability to governmental units rather than for improving local programs. Current annual evaluation activities conducted by the U.S. Office of Education, Office of Vocational and Adult Education, and the Mathematica Policy Research (MPR) firm are similarly focused on accountability. Although this activity is absolutely essential for demonstrating the impact of public-sponsored initiatives such as Tech Prep, local leaders should not confuse it with the kind of ongoing evaluation needed to make sound programmatic decisions about Tech Prep.

A closer look at what is happening with local Tech Prep evaluation practices reveals that many educational institutions—secondary and postsecondary—simply do not have the resources and expertise needed for evaluation. Given that observation, states must play a more active role in the evaluation of Tech Prep. State agencies must place a high priority on establishing the basic framework for local Tech Prep evaluation and provide the technical assistance to help local consortia carry it out. State agencies need not actually *do* the evaluation; however, they should take a much more active role in ensuring local consortia have the direction, support, and tools they need to conduct more useful evaluations themselves. Establishing a comprehensive measurement system of this scope—one that focuses on meeting both local and state needs—will take time and a great deal of collaborative energy, similarly to all other major undertakings associated with Tech Prep. Even though much of what will be required for this comprehensive evaluation system is not yet finalized, it is clear that it must focus on processes and outcomes and be based on a fundamental commitment to continuous improvement.

Process Evaluation

This type of evaluation provides information about how processes and components affiliated with Tech Prep are functioning. It should be used to describe exactly how the

various key components such as core curriculum, marketing, or guidance are being conducted. Based on baseline information about these components, process evaluation can pinpoint difficulties and identify where adjustments need to be made. A primary use of this type of evaluation is in detecting problems in program design early enough to correct them. Process evaluation should begin to be conducted during the planning phase and continue throughout the life of the initiative. In so doing it provides a sound foundation for ongoing assessment and improvement.

Overall, the purposes of process evaluation include the following:

- Monitoring program implementation and management to ascertain the value and appropriateness of goals, resources, programmatic procedures, and organizational structure and operating policies and practices.
- Accurately defining problems with any of the key components or processes associated with Tech Prep and identifying their potential causes.
- Improving programs by developing solutions to problems.
- Studying the impact of solutions by systematically gathering data to determine the impact of program changes on identified problems. The status of the problems, effectiveness of implementation strategies, and intended and unintended results can be reported to local and state leaders for future planning.

Judy Mamaras, director of the national Tech Prep demonstration site in Rhode Island, offered the following suggestions for process evaluation:

> Success in Tech Prep is something that you have to look at long-term because the changes involved are not something that take place in a year or even two years. [B]ecause we're in so many high schools . . . [we have been able] to determine certain key components that are needed for a successful program. When we're evaluating a program, we look at
>
> - administrative support;
> - support through an involved, informed guidance department who are properly identifying Tech Prep students;
> - team approach[es] in teaching and recruiting students;
> - an on-site coordinator in each high school to keep the program together and to facilitate communication;
> - strong program identity for students;
> - curriculum revision as absolutely key;
> - applied academics and a cooperative learning setting through a clearly defined Tech Prep course of study;
> - staff development;
> - parental awareness; and

- involvement in partnership with business and industry. (J. Mamaras, personal communication, December 21, 1993)

Outcomes Evaluation (Also Referred to as Outcomes Assessment)

This type of evaluation should be used to determine the effectiveness of outcomes as measured against clearly stated goals. It asks and answers the basic question of whether Tech Prep is producing its intended outcomes for the community, as well as for its organizations, programs, and students. With Tech Prep, a primary focus on student outcomes is of utmost importance. Outcomes evaluation can begin as soon as the major components of the program are fully operationalized and students are actively participating and moving through the program. To assess student outcomes earlier in the process will likely yield invalid information about their performance and potentially jeopardize the momentum of the implementation process if the results prove to be less than local leaders expect. For local consortia that were first funded when federal dollars became available in 1991, outcomes evaluation is probably just becoming a reasonable activity.

The focus of student outcomes assessment should be on determining what learners know and can do as a result of their experience with Tech Prep. McCaslin (1992) has developed a five-step process for conducting student outcomes assessment:

1. Select outcomes to be assessed.
2. Identify indicators for each outcome.
3. Identify information collection arrangements.
4. Determine the analysis procedures.
5. Report the information. (p. 103)

The *selection of outcomes* involves examining the vision, mission, and goals established for Tech Prep during the planning phase. The clearer the goal statements, the more able the consortium is to move directly to the creation of concise and relevant outcomes, and eventually to the development of meaningful performance measures and standards as well (see Hoachlander et al., 1992). McCaslin (1992) has recommended educators think about outcomes being in three different areas: (1) economic outcomes such as earnings and job satisfaction, (2) educational outcomes such as academic and occupational attainment, and (3) psychosocial outcomes such as aspirations, self-esteem, and leadership. Hoachlander et al. (1992) adds the area of accessibility to this list, meaning outcomes such as course enrollment and program completion.

Existing research on student outcomes associated with Tech Prep indicates that student outcomes in all four of these areas are a priority to local consortia. According to Layton and Bragg (1992) and Dornsife (1992a), outcomes considered important for Tech Prep are improved academic and technical skills, secondary and postsecondary program completion rates, job placement rates, and course enrollments at the secondary and postsecondary levels. Research conducted by Hammons (1992) adds to this list outcomes related to student career attainment, attitudes/perceptions, and other psychosocial areas. A recent national study of Tech Prep consortia (Bragg et al., 1994) revealed that the following fifteen *student* outcomes are all highly ranked by local coordinators:

1. Improved knowledge and skills in math
2. Improved problem-solving, thinking, and reasoning skills
3. Increased employability skills and work readiness
4. Increased matriculation from secondary to postsecondary levels
5. Increased awareness of and interest in technical careers
6. Increased knowledge and skills in vocational areas
7. Improved knowledge and skills in English/communications
8. Improved knowledge and skills in science
9. Increased motivation for learning
10. Increased secondary school completion rate
11. Increased interpersonal skills (team, leadership skills)
12. Increased postsecondary school completion rate
13. Increased employability in high-wage jobs
14. Increased self-esteem
15. Increased job satisfaction of students and graduates (p. 50, Table 8)

These outcomes are listed above in priority order from one to fifteen; however, all were rated over 4.0 on a five-point priority scale, indicating that all are considered to be a "high" or "very high" priority for students involved with Tech Prep.

According to Judy Mamaras, her Tech Prep consortium has found it very important to collect data on several of these types of outcomes. She described the importance of looking at retention, enrollment, and job placement to determine the success of a Tech Prep initiative:

> We have about 95% retention at the secondary level [between] students completing the program and graduating. Our retention is up to about 80% at

> the postsecondary level, which is very good. . . . Retention has become one outcome we look at that measures success for us. . . . The number of students increased from 105 to currently about 2,000 students at the secondary level. We have about 400 enrolled at the community college, and we have [students] in other postsecondary programs. The Community College of Rhode Island (CCRI) isn't the only option. We [also] look at placement at both the secondary and postsecondary level. We see that about 80% of the students are going on to some postsecondary activity. The placement is about 50-50 from [graduates] completing the Tech Prep program from CCRI. Half are going into employment and half are transferring to four-year schools. (J. Mamaras, personal communication, December 21, 1993)

Once a set of outcomes is clearly identified and defined, it is important to *identify indicators for each outcome*. Indicators can be thought of as the specific measures that need to be obtained to determine whether the outcome is being met. For example, an indicator of the outcome of "improved knowledge and skills in math" might be a score on a relevant paper-pencil test or performance-based test. An indicator of *improved vocational knowledge and skill* might be demonstration of a particular occupational competency. No matter the outcome selected, it is beneficial to use multiple indicators. Sometimes qualitative and quantitative measures can be used (e.g., standardized test scores as well as observations of performance in a real-world context). It is also important to begin by measuring the most critical outcomes. The list of fifteen outcomes presented above are all reported as high priority by local coordinators; however, most local consortia would not have the time, staffing, or money to carry out such an extensive outcomes assessment process. Even among these fifteen, some outcomes are probably more crucial than others. Making that determination and moving forward with measurement is what is needed at this step.

The step of *conducting the data collection* involves identifying new or modifying existing measurement tools, processes, and procedures for the purposes of assessment. McCaslin (1992) suggests local leaders need to address the following three questions:

1. Who will collect the data?
2. What conditions will be needed to collect the data?
3. When will the data collection need to be completed? (p. 105)

To ensure the rigor and consistency of the assessment process, it is important that the answers to these questions are determined and communicated well in advance of any assessment activity. For example, if teachers are to administer performance tests, they

need to know the exact guidelines for carrying out the tests; the materials students will need for the exercises; the day, time, and location for the performances; and who should receive the completed test information. This level of specificity is essential for every outcome measure being addressed. It is not necessarily a complicated activity; however, it must be precise and widely known to everyone participating in the process.

Carrying out the *data analysis procedures* is the fourth step in outcomes assessment. At this stage, data has been collected and the challenge is to make sense of them. Therefore, the goal of this step is to study the data sufficiently to identify findings that can explain which outcomes are being partially or fully met. The data analysis procedures selected are highly dependent upon earlier decisions about the appropriate outcomes and measures. Where standardized tests are administered to a large group of students, much of the analysis will be quantitative and statistical in nature. Where performance-based (i.e., authentic) assessment is used, a more qualitative analysis process will likely need to be developed. In either case, the goal of this step is to carry out analysis carefully and thoughtfully so that the findings can have as much meaning as possible.

Reporting evaluation findings is the fifth step. Local consortia must be concerned with the utility of evaluation findings. They can provide information for future planning and implementation and contribute to program improvement. The following are ways to ensure evaluation results are used to improve Tech Prep:

- Build in decision points that require evaluation findings to proceed, thereby creating the need for evaluation and a logical way for the findings to influence progress.
- Ensure that local leaders and stakeholders involved throughout the planning and implementation process have input into the evaluation.
- Demonstrate to these individuals and groups how evaluation findings can be used to improve Tech Prep.
- Be open, frank, and clear in reporting findings, both the positive and not-so-positive kinds.
- Provide fact sheets, interim reports, oral presentations, community forums, executive summaries, and technical reports to make evaluation results accessible to the many different audiences that need them.

By undertaking a step-by-step outcomes evaluation process such as the one advocated by McCaslin (1992) local consortia will be in a better position to do the following:

- Assess the relationship of outcomes to the local vision and goals, thereby providing useful information to consortia for carrying out future implementation activities.
- Assess local program performance and determine the extent to which it is contributing to the attainment of local or statewide standards.
- Determine whether unexpected outcomes are occurring, in addition to those clearly identified by the local consortium.

In an effort to identify the principles of good practice in assessment of student learning, the American Association of Higher Education Assessment Forum (1992) recommended the following nine points that fully support the approaches to process and outcomes evaluation discussed in this section of the document:

1. The assessment of student learning begins with educational values.
2. Assessment is most effective when it reflects an understanding of learning as multidimensional, integrated, and revealed in performance over time.
3. Assessment works best when the programs it seeks to improve have clear, explicitly stated purposes.
4. Assessment requires attention to outcomes but also and equally to the experiences that lead to those outcomes.
5. Assessment works best when it is ongoing, not episodic.
6. Assessment fosters wider improvement when representatives from across the educational community are involved.
7. Assessment makes a difference when it begins with issues of use and illuminates questions that people really care about.
8. Assessment is most likely to lead to improvement when it is part of a larger set of conditions that promote change.
9. Through assessment, educators meet responsibilities to students and the public. (pp. 2-3)

Ensuring Continuous Improvement

The process of conducting program evaluation is highly related to the idea of continuous improvement. If we cannot measure results, we cannot improve the performance of processes or systems. The practice of evaluation forces priorities. The right measures provide the basis for determining how well any process is producing intended outcomes and contributing to the effectiveness of the entire system. By focusing extensively on student outcomes, a local consortia is more likely to devote attention to the core concepts and key components associated with Tech Prep. Also, by learning how these outcomes function over time, consortium leaders can begin to build a system that not only tells them about quality at one point in time but also monitors and influences quality over the long-term.

Ongoing measurement is required to determine how a process is working and to make improvements when problems occur. By gaining an understanding of how a process or entire system functions over time, it is possible to make improvements. In local consortia that utilize a team structure like the ones described here, the responsibilities for continuous improvement logically fall to local leaders and stakeholder representatives who are already working to design and implement particular processes, as well as overcome barriers. Often these people are in the best position to carry out evaluation activities and make sensible decisions based on the findings various efforts produce.

CONCLUDING THOUGHTS

Since beginning this research, the federal School-to-Work Opportunities (STWO) Act was signed into law by President Clinton, heightening the importance of building Tech Prep systems that bridge past practices with a new vision of education. Strong local, state, and federal leadership is needed to move Tech Prep initiatives begun under the Tech Prep Education Act (Perkins II) forward to meet the requirements of the STWO Act. Many of the seventeen leaders interviewed as a part of this study viewed STWO as a logical extension of what many local Tech Prep consortia have already begun. However, for some local consortia, more work will be required to fully develop strong business-education partnerships that are required to support the work-based learning and school-to-work connecting components of STWO. All levels of the nation's educational system will be

challenged to create a cohesive and coordinated system, rather than one characterized by turfism and conflict. Tech Prep systems are an important vehicle to meeting that challenge.

What will Tech Prep look like when configured to meet the requirements of the Tech Prep Education Act of Perkins II and the STWO Act? Although there is no formula, no one model, we, the authors, envision Tech Prep systems that encompass the following six core concepts:

1. Tech Prep should be grounded in an integrated and authentic core curriculum that spans the educational system.

2. Tech Prep should formally link (articulate) secondary and postsecondary education, but optimally kindergarten through lifelong learning.

3. Tech Prep should be a highly relevant approach to teaching and learning, using the workplace and surrounding community to connect work-based learning to school-based learning.

4. Tech Prep should be an approach that focuses on outcomes and increased student performances.

5. Tech Prep should be an accessible and viable option for all students, not only the "neglected majority."

6. Tech Prep should be implemented with a highly collaborative approach built upon a network of people and organizations that form a local consortium.

Together, these six core concepts constitute the basis for reconceptualizing Tech Prep in a manner consistent with many of the fundamental principles of today's educational restructuring movement (Newmann, 1993). We envision such Tech Prep systems as having the potential to be a part of mainstream curricular reform. In fact, in some locations Tech Prep is already viewed in that way. How can other local Tech Prep initiatives be planned and implemented to accomplish this goal? A critical ingredient is a strategic organizational structure that taps into the vision and expertise of the local leadership and stakeholder groups. A local consortium that actively engages local schools, colleges, employers, and other organizations can become the lifeblood of a local Tech Prep system.

Local planning and implementation efforts should weave key components into a Tech Prep system. Key components are the concepts, actions, processes, and procedures that are interrelated in such a way as to create any system, a Tech Prep system in this case. The array of components that can be a part of a local initiative varies by locality and state; however, components such as consortium building, core curriculum, vocational and academic integration, articulation, business and industry partnerships, and equal access for members of special populations can provide the foundation for just about any Tech Prep system conceivable. Of course, the local systems themselves can also vary depending upon local and state needs, goals, and expectations. To illustrate this variation, five Tech Prep systems that local consortia are implementing are described below:

1. *Integrated Tech Prep*—This system combines ideas associated with Tech Prep with concepts linked to more advanced models of vocational and academic integration, rather than applied academics. Two approaches that provide a foundation for this intensive school-based model are career academies and occupational clusters, or simply cluster schools. With this approach, work-based learning experiences are used to support highly integrated vocational and academic school-based learning.

2. *Work-Based Tech Prep*—This system focuses on creating learning experiences that capitalize on the best that a combination of school and work have to offer in developing student vocational and academic competencies. Student learning is deliberately structured and strategically organized by instructional staff, employers, and sometimes other community members to link learning in the workplace to students' school- and college-based learning experiences.

3. *Tech Prep Baccalaureate Degree (TPBD)*—This system emphasizes formal articulation and designates the baccalaureate degree as the preferred credential for Tech Prep. It offers hope for transforming applied associate degree programs often thought of as "terminal" into viable transfer programs, and for expanding capstone postsecondary occupational-technical transfer education far beyond what is typically available today. Strong relationships between two-year and four-year postsecondary institutions are a prerequisite to making this system work effectively.

4. *Pre-Tech Prep*—This system extends the formal articulation and curriculum integration concepts downward into junior high, middle school, and sometimes elementary school to set the stage for Tech Prep throughout the remainder of a

students' learning experiences. Vertical curriculum alignment involving the elementary, secondary, and postsecondary levels is a necessity for this system. Beginning in the early grades, interdisciplinary, project-based curriculum, and team-centered cooperative learning are offered, supported by career awareness and exploration.

5. *Adult Tech Prep*—This system focuses on improving access to postsecondary education for adults who may have missed out on Tech Prep in high school (or earlier grades). This approach is designed to assist adults to transition into two-year college classes alongside high school graduates who participated in Tech Prep. Overall, the system is intended to provide adult students with the opportunity to move back into and out of college with Tech Prep credentials, ultimately reaching their goal of successful employment.

A shared vision and mission, goal setting, and policy formulation are important parts of an effective Tech Prep system. Creating these elements of a planning process may not necessarily occur upfront. Rather, they may be more meaningful if they emerge from the collective efforts of individuals participating in developing Tech Prep systems. Of course, any planning undertaken by a local consortium should reflect the unique character of students being served in the region. Local leaders should think seriously about how Tech Prep can contribute to an improved approach to education for *all* students, including but not limited to those described as the "neglected majority."

Unlike some past program development, implementation of Tech Prep should not be viewed as a one time experience. Rarely, if ever, can local leaders expect to see Tech Prep follow a linear progression from design to development to implementation to evaluation. Rather, throughout the implementation process, there is bound to be variation in the pace of adoption of key components, necessitating sensitivity to the way a Tech Prep system is introduced and nurtured along. Consequently, implementation should be viewed as a continual, never-ending activity where a hands-on, learning-by-doing approach is endorsed to create ownership for innovation and reform.

Finally, an environment of ongoing implementation requires an evaluation approach that is also continuous. At a minimum, evaluation should be used to (1) examine the effectiveness of processes, (2) assess the extent to which learner outcomes are being met,

and (3) ensure that continuous improvement is a constant goal. If these goals are met, the quality, effectiveness, and impact of Tech Prep systems can be determined and enhanced. To establish an evaluation effort comprehensive enough to address these goals will take time and a great deal of collaborative energy, in a similar fashion to all other major activities associated with Tech Prep. However, without this thorough approach, Tech Prep will lack the mechanisms to grow, change, and improve over time—all crucial features of reforms that must keep pace with our rapidly changing world. Evaluation ensures constant attention to improving an entire Tech Prep system. By making it a key component, Tech Prep can be an important contributor to the reform of the nation's educational system.

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